DECEMBER 1965 35 CENTS

Popular Science

MONTHLY

HENRY FORD II ON CAR SAFETY

Sneak Preview: Chevy's New Rival for the Mustang

CRAZY GADGETS of "The Man from U.N.C.L.E."

Home Wiring: How to Put in New Switches

HOW TO BUY COLOR TV PLUS — BONUS TEAR-OUT BOOKLET to keep on your set

POPULAR SCIENCE BONUS BOOKLET

COLOR TV: How to Live With it —and Love it

SECRETS OF A PERFECT COLOR TV PICTURE

Exciting Science Project: Build an Earthquake Detector

Great new taste,
rich aroma...
pipe tobacco does it.

Enjoy America's best-tasting pipe tobacco in a filter cigarette!

Urheberrechtlich geschütztes Material

Where did the new Norelco Speedshaver ever get the idea that it could match shaves with a blade?

It's all in our head.

(WHICH IS NOW MORE THAN 18% THINNER FOR 18% CLOSER SHAVES)

The new Norelco Speedshaver® gives the *close* electric shave—so incredibly close that we dare to match shaves with a blade. And yet the Norelco shave is still the *comfort* shave. Because Norelco rotary blades gently stroke off whiskers. Never grab or pull. Never cut or nick. Norelco "Floating Heads" glide smoothly over every contour of your face. There's also a pop-up trimmer that makes neat work of sideburns. Easy "flip-open" cleaning. Voltage selector. On/off switch. And a coil cord. All in all, more shaving features than any other electric shaver. We'll match the shave you get with the new Norelco Speedshaver against any electric shaver and win by a head. And then it's *en garde*, blades!

Great first shaver.
The new Norelco 'Flip-Top' Speedshaver. Now in bright maroon.

Perfect second shaver.
Now at a new low price. The Norelco Cordless with drawstring pouch.

Norelco® The Close Electric Shave

©1965 North American Philips Company, Inc., 100 East 42nd Street, New York, New York 10017

Other products: Electric Housewares, Hearing Aids, Radios, Tape Recorders, Dictating Machines, Electronic Educational Kits. Medical X-ray Equipment, Electronic Tubes and Devices.

Urheberrechtlich geschütztes Material

Popular Science
REG. U.S. PAT. OFF. MONTHLY

Founded in 1872 **DECEMBER 1965** Vol. 187 No. 6

HIGHLIGHTS OF THIS ISSUE:

Chevrolet's New Rival for the Mustang PAGE 43

A sneak preview of the car Chevrolet will bring out—probably in 1966½—to fight the Mustang. In GM inner circles, it's known as the Panther.

Crazy Gadgets of "The Man from U.N.C.L.E." PAGE 46

The inside story of the wonderful, wacky armory that U.N.C.L.E. agents use to combat the evil forces of Thrush.

Henry Ford II Talks About Car Safety PAGE 62

Ford Motor Co.'s Board Chairman tells what auto makers are doing about safety—and notes three other areas where action is needed.

Color TV: How to Live with It—and Love It PAGE 75

After you've bought your color TV (See page 70), this tear-out-and-save booklet will tell you everything you need to know to get perfect color.

The Secrets of Drill-Press Mortising PAGE 146

Cut those square holes the easy way—with mortising bits and chisels.

CARS AND DRIVING

43 Chevrolet's New Rival for the Mustang
54 Ford Fairlane vs. Plymouth Satellite
60 First of Europe's '66 Cars
62 Henry Ford II Talks About Car Safety
87 What's New for Your Car
90 When You Rent a Car

TV, RADIO, AND ELECTRONICS

70 How to Buy a Color TV Set
75 Bonus Booklet. Color TV: How to Live with It—and Love It
102 Television Eyes Catch Criminals in the Act

SCIENCE AND INVENTIONS

46 Crazy Gadgets of "The Man from U.N.C.L.E."
48 Booster Pump Gives New Life to Failing Hearts
52 A Versatile New Dam That Comes . . . and Goes Away
94 They're Still Inventing the Telephone
108 Jack-in-the-Box Lighthouse Becomes World's Tallest
110 How They Make a Typewriter Talk
113 Rocket-Firing Small Arms

HOME AND SHOP

120 How Two Can Live Happily in the Same Room
124 3 Projects for a Child's Room
126 Where's That Drain Stoppage?
129 What's New for Your Home
130 One Extinguisher Controls All Fires
132 Desks You Size to Suit Your Home
135 How to Build an Earthquake Detector
140 Newspaper Logs Keep the Home Fires Burning
142 This Toolbox Helps Do the Work
145 What's New in Tools
146 The Secrets of Drill-Press Mortising
152 Gun Rest for Your Car
153 Build a Hat-Tipping Snowman
154 Fast-Set Glue Gun for the Home
156 Improving Your Home Wiring: How to Install New Switches
162 How to Invent the Wheelbarrow

SPACE AND AVIATION

58 U.S., Russia Vie for Biggest Plane
88 Biggest—and Ugliest—Chopper
106 Dr. von Braun: Rocket-Riding Cameras Show How Boosters Behave

COMING NEXT MONTH

- The first **real** test of Olds' front-wheel-drive car:

10,000 MILES IN A TORONADO

Popular Science editors put a year's average mileage on America's newest, most exciting automobile to bring you the complete, candid story on how it handles and performs.

- **Report on the New Railroad Trains.** Soon to go into operation in the eastern U.S., they'll get you there "faster than flying."
- **The Truth About Motor Oils.** Here's what you should know about the right oil for your car's engine—and how it affects cold-weather starting.
- **Why I Believe in Flying Saucers:** An eye-witness account by MacKinlay Kantor.
- **What's New in Home Heating.** A valuable roundup of information on the new heating systems.
- **How to Thief-Proof Your Car—Electronically.** Ingenious devices you can install yourself.
- **James Bond's Weird World of Deadly Gadgets. Behind the scenes in 007's movie, Thunderball.**

Plus many other exciting and useful features, and all the regular PS departments. All in the big January issue—on sale December 30.

BOATS AND BOATING

66 The Inside Story of Outboard Spark Plugs

AUTO UPKEEP

164 Gus Helps Santa Get Going
170 Hints from the Model Garage

PHOTOGRAPHY

114 Half-Frame Cameras Are Catching On

PICTURE NEWS

59 Boat is Powered by Sun's Rays
101 TV So Small You Can Hardly See It
118 Tiny Jigsaw Cuts Wood, Won't Cut Finger

EVERY MONTH

6 PS Readers Talk Back
12 "Say, Smokey—"
19 Science Newsfront
38 Detroit Report
97 I'd Like to See Them Make
104 New Ideas from the Inventors
174 Wordless Workshop

Mechanics and Handicraft ® Popular Science ®

COPYRIGHT © 1965 BY POPULAR SCIENCE PUBLISHING CO., INC. ALL RIGHTS RESERVED.

PRINTED IN U.S.A. 24

Elmer's has the right glue for every job you do

Elmer's Contact Cement — the ideal adhesive for plastic laminating jobs. Bonds instantly, dries in only 10 minutes under ideal conditions. Comes in jars and tubes too.

Elmer's Glue-All — the all-purpose, easy-to-use adhesive for any porous material. Forms a strong, transparent, lasting bond, Non-clog dispenser top.

Whatever your gluing needs, you can look to Elmer's for the right adhesive. Take the bonding of counter tops, sink tops, and veneer edging—ELMER'S CONTACT CEMENT is perfect. And it's also useful for applying prefinished wallboard to studs and furring, with no need for unsightly nailing. Spreads easily with brush or roller without mixing. For all kinds of cabinetwork and interior construction, ELMER'S GLUE-ALL is rightly called "the best glue in the joint." A favorite of woodworking specialists everywhere. Send a stamped, self-addressed envelope for your FREE copy of "Elmer's Wood-Gluing Handbook." Write: The Borden Chemical Company, 350 Madison Ave., N.Y., N.Y. 10017. (Available in Canada).

BORDEN CHEMICAL

©T&C

Urheberrechtlich geschütztes Material

ERNEST V. HEYN
Associate Publisher and Editor-in-Chief

HUBERT LUCKETT, Executive Editor
KENDALL W. GOODWYN, Managing Editor
HARRY SAMUELS, Art Director
ROBERT P. STEVENSON, Editor, Home and Shop Group

EVERETT H. ORTNER, Copy Chief
DEVON FRANCIS, Special Assistant to the Editor

SENIOR EDITOR Alden P. Armagnac • AUTOMOTIVE EDITOR Jan P. Norbye
FEATURES EDITOR W. Stevenson Bacon • PHOTOGRAPHY EDITOR Everett H. Ortner
HOME WORKSHOP EDITOR Charles E. Rhine • ELECTRONICS EDITOR Ronald M. Benrey • BOATING EDITOR Jim Roe
WEST COAST EDITOR Wesley S. Griswold • EUROPEAN EDITOR David Scott
ASSOCIATE EDITORS Frank Dorr, Herbert O. Johansen, Herbert Shuldiner, Ruth Westphal
ART EDITORS Herbert Anthony, Richard J. Meyer
ART PRODUCTION MANAGER Henry W. Kazmirowski • ART ASSOCIATE W. David Houser
EDITORIAL ASSISTANTS Ruth Velazco (Chief), Ann Dallas, Claire B. Kelly, Janine Molina, Mary Rose Schneider

Return postage must accompany all manuscripts submitted. We cannot be responsible for the loss of manuscripts or photos.

E. S. DUFFIELD, President

JOHN R. WHITING, Executive Vice-President and Publisher
EUGENE WATSON, Executive Vice-President Circulation
CHARLES S. THORN, Executive Vice-President Advertising

EDITORIAL OFFICES: 355 Lexington Ave., New York, N. Y. 10017

PUBLISHED MONTHLY by Popular Science Publishing Co., Inc., 355 Lexington Ave., New York, N. Y. 10017
SUBSCRIPTION SERVICE. ***New or renewal orders:*** Send to Popular Science Subscription Department, Boulder, Colo. 80313. One year $4, 2 years $7, 3 years $9 in U.S., its possessions, and Canada. Elsewhere, 1 year $6.50, 2 years $12, 3 years $17. Single copy 35¢. *Subscription orders processed electronically* • ***All subscription adjustments:*** Write to Robert Harlan, Popular Science, P.O. Box 1083, Boulder, Colo. 80313. For change of address allow four weeks; please give both old and new addresses. Notices of undelivered copies (Form 3579) to Mr. Harlan. • Second class postage paid at New York, N.Y., and at additional mailing offices. Entered as second class matter at the Post Office Department, Canada. Printed in U.S.A. • ADVERTISING OFFICES. NEW YORK: 355 Lexington Ave.; CHICAGO: 360 N. Michigan Ave.; DETROIT: 2907-8 Book Bldg.; LOS ANGELES: 8721 Beverly Blvd.; SAN FRANCISCO: 110 Sutter St.; DENVER: 333 W. Colfax Ave.

Want versatility in a power saw?

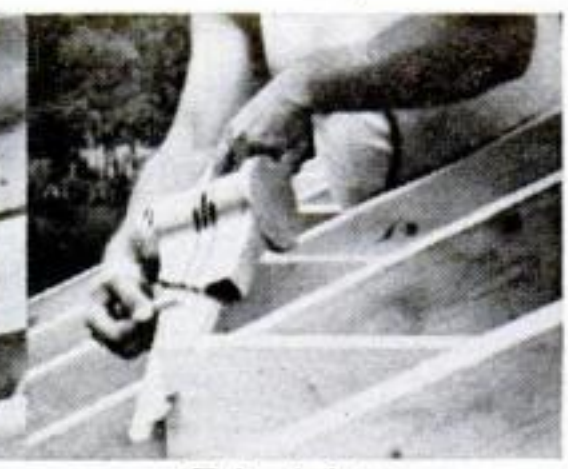
Try the WELLSAW 400

Trim Sheathing flush

Trim fence posts

Whatever the extent of your tool assortment, it should include the WELLSAW 400 with 8″ or 16″ capacity. It handles tough jobs like those illustrated, as well as the routine jobs. It's packed with power, precision built to industrial standards and safer to use than any other power hand saw. Your equipment, hardware or tool dealer has a WELLSAW 400 or can get one for you. See him today.

Cut rafters


Trim joists

Send coupon for "Sawing Magic of Wellsaw 400". 16 pages telling the story of WELLSAW 400 versatility. PS1265

WELLS MANUFACTURING CORP.
500 Service Road, Three Rivers, Michigan

Name_____

Address_____

City_____ State_____

Trim trees

Cut fence rails

Urheberrechtlich geschütztes Material

"THEY TOLD ME I DIDN'T HAVE WHAT IT TAKES!"

The words hurt. But deep down I knew what the boss was saying was true.

"Sure you're a good man, Frank. You work hard. What we need, though, are men with special training. Job specialists who can come up with the right answers. Nowadays experience isn't enough."

So there was the answer. Why other younger men were moving ahead, earning pay raises. getting the good jobs. Why I was being left behind.

I just didn't have what it takes.

You feel desperate at times like that. Family to support. Job to hold down. No chance for the future.

Then I heard about I.C.S. How I.C.S. had helped others like me get the job training they needed to get ahead. Some even found new careers. I figured maybe I.C.S. could help me. I clipped out the coupon from an I.C.S. ad and mailed it in. The free career kit I received a few days later convinced me to sign up for a course.

Things began to happen after that. The instruction was practical, down to earth. It seemed what I learned the night before I was able to apply on the job the next morning.

Word got around I was taking an I.C.S. Course. My boss learned of it and three months later I got a raise. Six more months and I got another. Now I'm looking forward to a promotion.

Once in a while I remember the time the boss said I didn't have what it takes. Makes me smile now. But still I thank my lucky stars for I.C.S. Maybe you will, too.

Clip coupon here—and take your first big step to real success! **I.C.S., Scranton, Penna. 18515** **Accredited Member National Home Study Council**

INTERNATIONAL CORRESPONDENCE SCHOOLS ICS 75th YEAR

Dept. 1296, Scranton, Penna. 18515 (In Hawaii: P. O. Box 418, Honolulu. In Canada: I. C. S. Canadian, Ltd.)

Without cost or obligation, rush me FREE Success Kit, with 3 valuable booklets: (1) How to Succeed; (2) opportunity booklet about the field I've checked below; (3) sample I. C. S. lesson. **Write for new W. I. C. S. package for women.**

ARCHITECTURE and BUILDING TRADES
- ☐ Air Conditioning
- ☐ Architecture
- ☐ Arch. Drawing
- ☐ Building Contractor
- ☐ Carpentry & Millwork
- ☐ House Planning
- ☐ Painting
- ☐ Plumbing & Heating

ART and DESIGN
- ☐ Commercial Art
- ☐ Interior Decorating
- ☐ Illustrating
- ☐ Show Card & Sign Painting
- ☐ Sketching and Painting

AUTOMOTIVE
- ☐ Auto Electrical Technician
- ☐ Automotive Mechanic
- ☐ Engine (Gas & Diesel)
- ☐ Engine Tune-Up
- ☐ Transmission Specialist

BUSINESS
- ☐ Accounting
- ☐ Cost Accounting
- ☐ Public Accounting
- ☐ Bus. Administration
- ☐ Executive Training
- ☐ Marketing
- ☐ Personnel-Labor Relations
- ☐ Practical Accounting
- ☐ Programming for Digital Computers
- ☐ Purchasing Agent
- ☐ Real Estate
- ☐ Salesmanship
- ☐ Sales Mgmt.
- ☐ Small Business Mgmt.
- ☐ Traffic Mgmt.

CHEMICAL
- ☐ Analytical Chemistry
- ☐ Chem. Engineering
- ☐ General Chemistry
- ☐ Chem. Lab. Technician
- ☐ Nuclear Energy
- ☐ Plastics
- ☐ Pulp, Paper

CIVIL ENGINEERING
- ☐ Civil Engineering
- ☐ Highway Blueprints
- ☐ Highway Engineering
- ☐ Structural Blueprints
- ☐ Sanitary Engineering
- ☐ Structural Engineering
- ☐ Surveying & Mapping

DRAFTING
- ☐ Architectural Drafting Technology
- ☐ Electrical and Electronic
- ☐ Mechanical

ELECTRICAL
- ☐ Elec. Appliance Servicing
- ☐ Electrical Engineering
- ☐ Elec. Motor Repairman
- ☐ Industrial Telemetering
- ☐ Instrument Technician
- ☐ Practical Electrician
- ☐ Practical Lineman

ELECTRONICS
- ☐ Automation
- ☐ Electronic Computers
- ☐ Electronics Technician
- ☐ General Electronics
- ☐ Hi-Fi Stereo and Sound Systems
- ☐ Industrial Electronics

ENGINEERING (Professional)
- ☐ Chemical ☐ Civil
- ☐ Electrical
- ☐ Mechanical

ENGLISH and WRITING
- ☐ Better Business Writing
- ☐ Introductory Technical Writing
- ☐ Short Story Writing
- ☐ Practical English

HIGH SCHOOL (Diploma)
- ☐ High School Business
- ☐ High School General
- ☐ High School Math
- ☐ High School Secretarial
- ☐ High School Vocational
- ☐ College Preparatory

LANGUAGES (Edited by Berlitz)
- ☐ French ☐ German
- ☐ Italian ☐ Spanish

MECHANICAL and SHOP
- ☐ Gas and Electric Welding
- ☐ Industrial Engineering
- ☐ Industrial Instrumentation
- ☐ Machine Design
- ☐ Machine Shop Practice
- ☐ Mechanical Engineering
- ☐ Reading Shop Blueprints
- ☐ Tool Design
- ☐ Toolmaking
- ☐ Safety Engineering

SECRETARIAL
- ☐ Clerk-Typist
- ☐ Legal Secretary
- ☐ Medical Secretary
- ☐ Professional Secretary
- ☐ Shorthand
- ☐ Stenographic ☐ Typist

STEAM and DIESEL POWER
- ☐ Boiler Inspector
- ☐ Power Plant Engineering
- ☐ Stationary Diesel Engineering
- ☐ Steam Engineering

SUPERVISION
- ☐ Foremanship—Suprv'n
- ☐ Personnel—Lab. Rel'ns

TV-RADIO
- ☐ Radio and TV Servicing
- ☐ Radio-Telephone License
- ☐ TV Technician
- ☐ Practical Radio-TV Engineering

MISCELLANEOUS
- ☐ Textile
- ☐ Other (please specify)

Name _____ Age _____
(Please indicate whether Mr., Miss or Mrs.)

Address _____

City _____ State _____ Zip Code _____

Employed by _____ Working Hours ___ A.M. to ___ P.M.

Occupation _____

Special low rates to members of the U. S. Armed Forces! Special training programs for industry.

Urheberrechtlich geschütztes Material

PS Readers Talk Back

Want to get something off your chest? Write "Readers Talk Back," POPULAR SCIENCE, 355 Lexington Ave., New York, N.Y. 10017.

Rough on Rambler?

I think you were a little rough on the American Motors Rambler ["New Car News," Oct.]. I've driven Ramblers many thousands of miles over a rural mail-delivery route, and found them very satisfactory. How about the Rambler features other manufacturers don't have or have copied: unitized body, curved-glass doors, and so on?

GORDEN L. MILLER, Ogden, Iowa.

Wild Wildcat

No wonder the gentleman on page 61 of your October issue is peering so intently at the interior of the Buick Wildcat! The steering wheel is on the *right*. Right?

CARL VON MOOR, Philadelphia.

Shame on our art editor for "flopping" the photo!

No string in caves

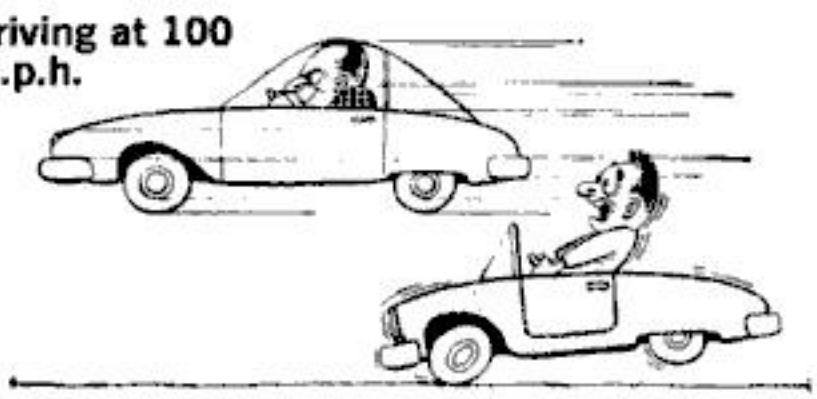
Most caves have one main passage with short side passages, making string unnecessary ["How They Rescued Me 200 Feet Underground," Oct.]. String in a cave is dangerous, as you can trip over it.

DIXON B. HOYLE, Boca Raton, Fla.

. . . Only an unadvised novice would follow such a Tom Sawyer procedure. Carrying lengths of heavy twine around is a good way to discourage oneself from caving. Safety is the primary concern of the National Speleological Society (2318 North Kenmore St., Arlington 1, Va.), which will give addresses of nearby members to would-be cavers, in order that these novices may gain their first caving experiences under expert supervision.

ROBERT R. FENICHEL, NSS, Cambridge, Mass.

Driving at 100 m.p.h.



There are three or four types of engines that could take steady speeds of 100 m.p.h. or more ["How Fast Will We Drive," Oct.]: The closed-circuit steam engine, the fuel-cell-powered electric motor, the gas turbine, and diesel. The only trouble is that nobody has yet figured a way to build people that can drive at 100 m.p.h.

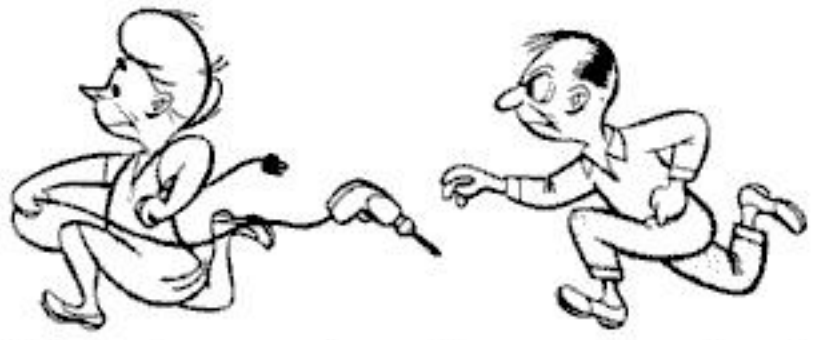
WILLIAM A. OLSEN III, Placerville, Calif.

A Mercury Comet ran 100,000 miles at 100 m.p.h. about a year ago, and most 1966 models can duplicate that performance. Handling a car at 100 becomes relatively easy on roads engineered for speed. Add a number of safety features and a better system of driver licensing, and you have the Century.

. . . You must have a grudge against VW owners. Since when is 12-15 m.p.g. economical when people are already having trouble feeding their 17-m.p.g. gas guzzlers the premium fuel they require? I'll stick with my VW. It will cruise all day at over 70, and it's fun to drive.

GEORGE GARREN, Dade City, Fla.

The Female delinquent



What do you do with an otherwise bewitching wife who swipes your best screwdriver to open jars with, grabs the extension cord in the shop for her sewing machine, and uses the top of the mower as a cart to haul rock? Comes the winter and the long-handled snowbrush is gone from my car. She's latched onto it to clean out the dust under the refrigerator! Don't tell me to buy her tools of her own —how would I know what to buy when I don't know what she'll go for next?

E. L. HARDY, Fort Lee, N.J.

Don't ask us. Just keep her away from our tools.

How sharp is fuzzy?

Stopping down a large lens too far may cause multiple imaging or even vignetting, but not fuzziness as Mr. McCafferty asserts ["A's to Your Q's About Camera Lenses," Oct.].

ANGUS MACDONALD, Charlottesville, Va.

A lens will not be as sharp stopped down as it will be at its optimum point—two or three stops from maximum aperture. Depth of field will increase at minimum aperture, of course, but that's something else.

What's AC polarity, he asks

"Gus Cracks a Case" [Sept.] brings up something that has puzzled me for years. Gus says that high voltage should always be negative at

Continued

Urheberrecht ch geschützes Mate

You will be received with open arms if you are trained in Accounting

Stop worrying about security for the rest of your life!

Be a trained Accountant

Learn in your spare time at home. You'll be welcomed into a high-pay field where there are more jobs than there are people to fill them.

THE demand for trained Accountants far exceeds the supply. Salaries keep going higher, promotions come faster. Many Accounting-trained men are being moved up to important management positions. Why remain in a job with an uncertain future when you can earn such big rewards in money, prestige and assured security?

You can take LaSalle Accounting training at home, in your spare hours, without any previous bookkeeping experience. LaSalle's distinguished faculty starts you at the beginning; explains every basic Accounting principle and method; gives you actual Accounting problems with your lessons, then corrects and grades your work; shows you exactly how accountants on the job handle these problems. Your training is complete, practical and enjoyable. You are thoroughly prepared for the Accounting tasks you will be expected to handle on the job.

Your career could not be in more experienced hands. For over half a century, LaSalle has been a world leader in business training, with over 1,000,000 students enrolled. A LaSalle diploma in Accounting is a credential respected by employers.

Send for free booklet and sample lesson

If you are truly seeking a more rewarding job, with higher pay, a solid position in the business world and all the good things that come with success, you owe it to yourself to read LaSalle's famous booklet "Opportunities in Accounting." With it you will receive a free sample lesson in Accounting which will demonstrate how LaSalle makes home study easy, interesting and thoroughly practical. Mail coupon to LaSalle, 417 S. Dearborn, Chicago, Illinois 60605.

LA SALLE EXTENSION UNIVERSITY

A Correspondence Institution

417 S. Dearborn, Dept. 48-045, Chicago, Illinois 60605

185

Please mail me, free of cost or obligation, your illustrated booklet "Opportunities in Accounting" and also your sample lesson.

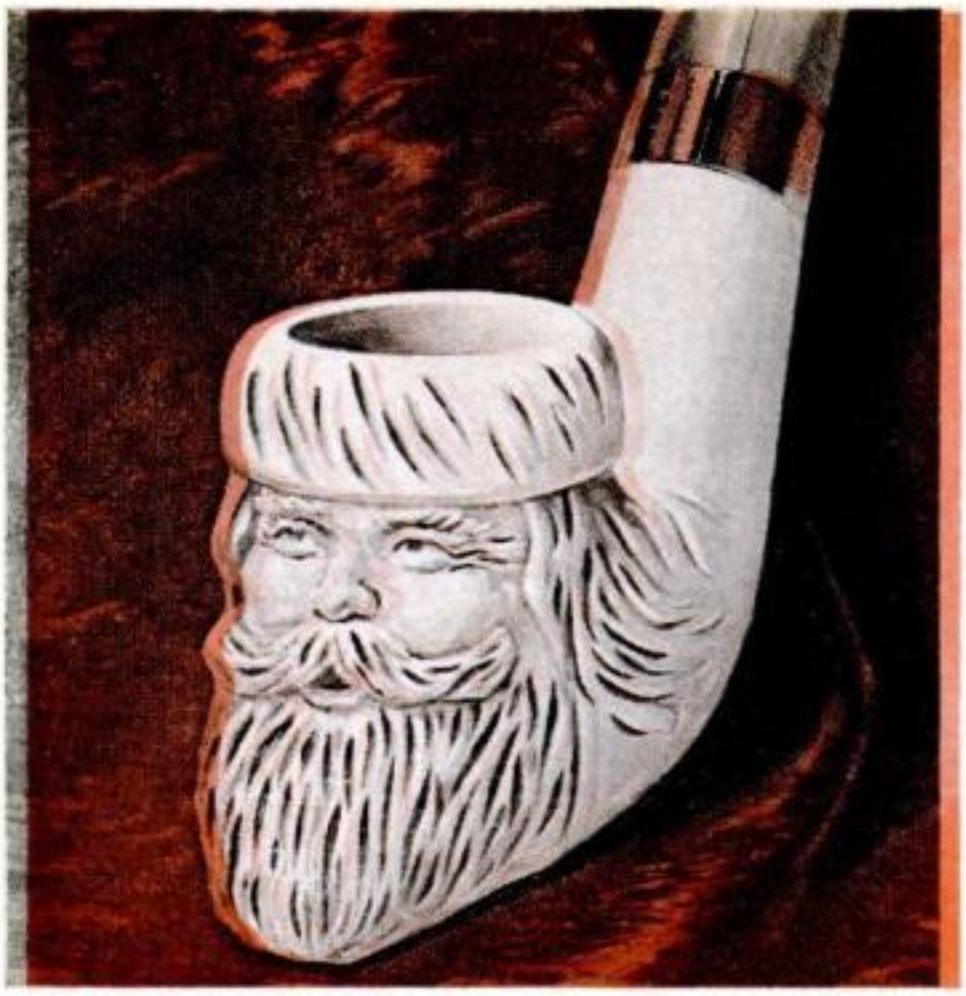
Name ..... Age .....

Address ..... County .....

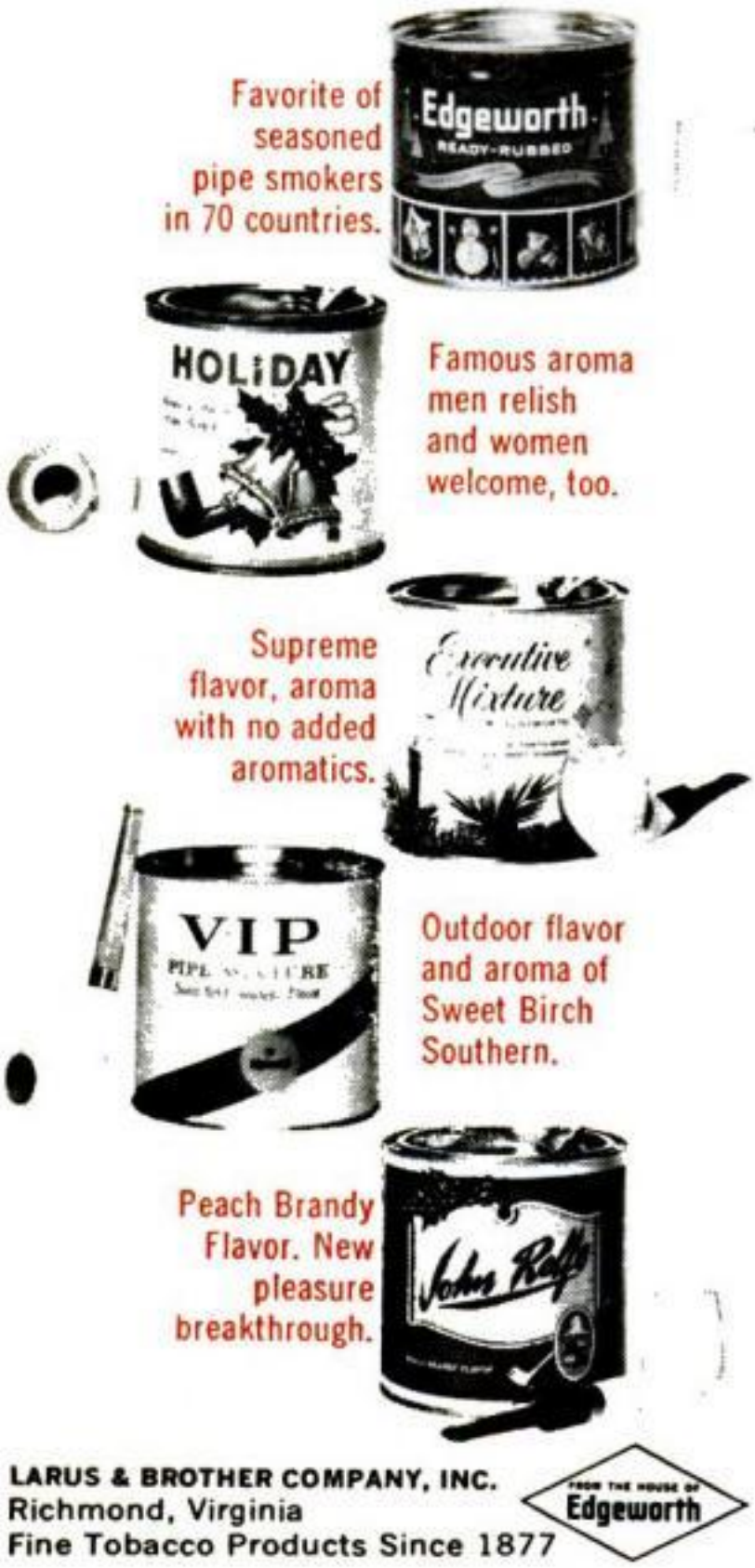
City & State ..... Zip No. .....

Occupation ..... Working Hours .... A.M. . . P.M.

Urheberrechtlich geschütztes Material



Light up Christmas


Favorite of seasoned pipe smokers in 70 countries.
Edgeworth
READY-RUBBED
HOLIDAY
Famous aroma men relish and women welcome, too.
Supreme flavor, aroma with no added aromatics.
Executive Mixture
VIP
Outdoor flavor and aroma of Sweet Birch Southern.
Peach Brandy Flavor. New pleasure breakthrough.
John Ruffs

LARUS & BROTHER COMPANY, INC.
Richmond, Virginia
Fine Tobacco Products Since 1877

FROM THE HOUSE OF Edgeworth

PS Readers Talk Back

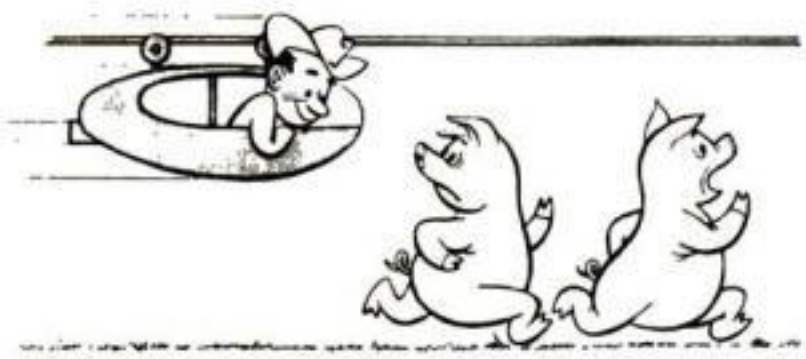
[*Continued*]

the plug terminals, but if the current flow in the high-voltage system alternates continuously between plus and minus, how can there be a plus or minus connection? Is there a plus or minus on 115-volt AC?

H. E. ZINK, Massillon, Ohio.

Actually, the ignition pulses are AC, but—depending on how the coil is connected—half of the AC cycle gets pretty well chopped off in the damping process. All you have, then, is a voltage spike going in a positive direction or negative direction. What Gus is saying is that it should be negative. Yes, there is a plus or minus on 115-volt AC, but don't try to find it—it changes 60 times a second.

Fried ham?



Do you have any information available on how to build a model monorail out to my pig pen? I need about 600 feet of track, and plan to use rocket or jet motors.

ARDEN LOMMEN, Borup, Minn.

Anybody got a suggestion?

Blush, Norbye

I think PS is the greatest, but it would be greater if Jan P. Norbye would not constantly slant his articles in favor of General Motors. The June article ["Suddenly Pickup Trucks Are IN"] was a good example of biased opinions.

ESTON LAMAS, Seattle, Wash.

Yes sir, right now!

Hey, hey, HEY! Vot's the idea of leaving out the "Short Cuts and Tips" page this month [Sept.]—my favorite feature. Don't think this omission passed unnoticed. Put it back, double quick, or I'll sue you for divorce.

ANDY VENA, Philadelphia

Sorry, we'll try not to do it again, but sometimes space problems force omissions.

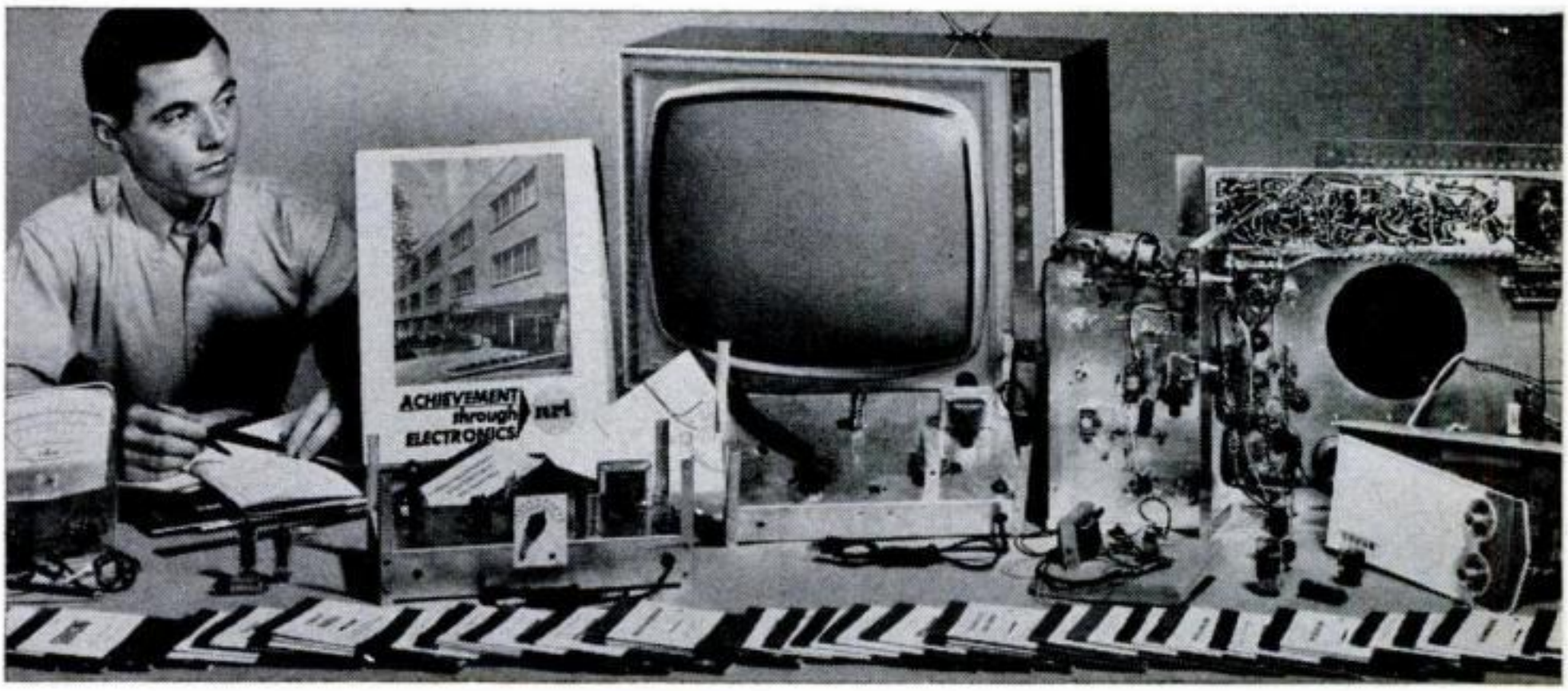
Nuts and bolts

When the September issue of PS hit the newsstand, I bought a copy. Sure enough, there it is. On page 30. The "Detroit Report." All about the glorified buckets of bolts Detroit is turning out and calling safe. I say nuts. Are they building padded cells or parachute harnesses? Maybe both? But then, with three or four tons of hard-

Continued

Urheberrechtlich geschütztes Material

LEARNING RADIO-TELEVISION, ELECTRONICS IS FAST, EASY, INTERESTING WITH NRI



NEW ACHIEVEMENT KIT—CUSTOM TRAINING KITS—"BITE-SIZE" TEXTS YOU GET MORE FOR YOUR MONEY FROM NRI

All the material you see above is included in just one NRI home training course. Other courses are equally complete. But NRI training is more than kits and texts. It's also personal services which have made NRI the 50-year leader in training at home for fast growing Radio-TV, Electronics.

Choose From 10 NRI Training Plans

NRI has a training plan to fit every interest, every need in Radio-TV, Color TV and Electronics. You can be your own boss in a Radio-TV Servicing business of your own or you can make $3 to $5 an hour fixing sets in your spare time. Or you can be a part of the Electronics "revolution" in business and industry. You may want to get into the fascinating fields of broadcasting-communications. You may want to take part in missile, rocket, satellite or other government programs. An understanding of computers may be necessary in your work. Perhaps you want to "brush up" on math, electronic terms or basic principles. Whatever your interest, you'll find an NRI course tailored to your needs.

Revolutionary "3-Dimensional" Method

Regardless of your educational background, you can effectively learn the Electronics field of your choice the NRI "3-Dimensional" way. NRI has simplified, organized and dramatized subject matter to make your training at home entertaining, easy. Catalog gives you complete information. Read about the exclusive Achievement Kit NRI sends you the day you enroll. Read about custom designed training equipment NRI gives you at no extra cost, to give you essential, practical experience. Equipment you build, tests you make bring to life what you read in NRI's unique "bite-size" lesson texts.

Move Ahead In Fast Growing Industry

TV-Radio, Electronics is moving ahead fast. The demand for skilled technicians is great and growing. Discover how you can be a part of the Electronics Age — starting soon. Mail coupon now for free NRI Catalog. NATIONAL RADIO INSTITUTE, Electronics Division, Washington, D. C. 20016. No salesman will call. No obligation.

Thousands Owe Success to NRI

F. W. COX, Hollywood, Calif., averaged $150 a month spare time while training, now has his own full time TV-Radio service business. ALLAN R. TOWNSEND, Topeka, Kan., is a missile officer at Atlas ICBM site, fixes radios and TV sets spare time. R. L. WOOD, Fargo, N. D., got his FCC license and is Master Control Engineer with KXIB-TV. J. J. JENKINS, San Diego, Calif., says his NRI training is priceless. He is Frequency Coordinator for the 11th Naval District.

Mail Now for FREE Catalog

NATIONAL RADIO INSTITUTE 101-125
Electronics Division, Washington, D.C. 20016

Send me your FREE Catalog. (No salesman will call.)

Name_____ Age____
(Please print)

Address_____

City_____ State_____ Zip Code____

ACCREDITED MEMBER NATIONAL HOME STUDY COUNCIL

Over 50 Years of Leadership in Electronics Training

Urheberrechtlich geschütztes Material

Of Course···
Red Top Air Filters Are Better!

WIX didn't put the "Red Top" on Polymite Air Filters for "kicks." That distinguishing feature identifies a technically improved product...one which is nearly impossible to install in the car upside down. The part number is imbedded in the "Red Top"—not stamped on. That's mighty useful when it's time to change the Filter.

The technical improvements that save you money are: positive seals to prevent leaking dirty air and "Arch Pleats" for greater efficiency, more mileage and greater savings on gasoline. "Arch Pleats" are important where the pleats of ordinary filters pinch together and impede the flow of air halfway down the fold, the "Arch Pleat" does not collapse. Thus, you get a bonus in extra value and substantially greater mileage.

Ask your service man for WIX Polymite Air Filters. Don't let him kid you about all Air Filters being the same. If he doesn't have WIX, call up a local WIX jobber...he'll tell you where you can get them.

WIX® FILTERS

WIX CORPORATION • GASTONIA, N. C.

THE GOLD STANDARD IN FILTRATION

PS Readers Talk Back

[Continued]

ware and over 100 horsepower to propel one skinny neck down the turnpike, naturally it's necessary to have the padded cell built right in.

CARL B. MAIN, Lemon Grove, Calif.

The cost of vinyl siding

Your article "Those Amazing New Sidings with Built-In Paint" [Sept.] is a commendable effort, but we hasten to point out an error with reference to the installed-price range of our solid vinyl siding. It is very comparable to the installed-price range of aluminum siding. Therefore your price range of $60-$75 per 100 square feet is misleading.

J. R. DOTY JR., Bird & Son, E. Walpole, Mass.

. . . The price ranges you listed for vinyl siding and steel are both low. They should be $80 to $115 per 100 square feet.

TONY WALDEYER, Monsanto, St. Louis, Mo.

. . . Our company manufactures aluminum, steel, and plastic sidings of several different types. The installed-price range of aluminum siding from $80 to $115 per square is basically correct—we sell steel for more per square than aluminum siding with a comparable finish; and as the installation labor cost is also more per square, the installed-price range is generally higher.

As for solid-vinyl siding, it is the highest-priced siding in our line, so the installed-price range is higher than aluminum or steel.

N. A. BLAIR
Mastic Corporation, South Bend, Ind.

Information on government lands

We were greatly disturbed by statements contained in the article, "For Sale—Vacation Sites from Uncle Sam" by Ed Kerr [June], which suggested that government lands and reliable information concerning them are available only from the Bureau of Land Management. This, of course, is untrue. Our monthly publication, *Land Opportunity Digest*, provides the public with reliable and factual information about government lands that are available from the Bureau of Land Management, as well as from various other federal and state agencies. We would appreciate your correcting the misleading statements contained in this article.

JOE F. VAIL, Editor
Indianapolis, Ind.

We regret any misunderstanding that may have resulted from the article. Neither PS nor author Kerr had any intention of questioning the accuracy of material contained in Land Opportunity Digest, published by Pulse Publications.

Urheberrechtlich geschütztes Material

How to fix a plastic hinge...

or almost anything else.

by Roger C. Whitman, author of the syndicated column, "First Aid For The Ailing House"

My wife Hope has been a friend of Woodhill Chemical's Duro Plastic Aluminum since a few summers ago when she was living alone in our rented vacation cottage. Accidentally, one day, the plastic freezer-compartment door slammed shut and half the molded hinge broke off, leaving nothing to hold the hinge pin.

Problem enough right there. But the real problem was that there was no local repair service . . . and a new door would take days or weeks.

"So," reported my wife, "I bought a tube of Duro Plastic Aluminum. I squeezed out a blob on the edge of the door, and with the help of a nail file I shaped it into a cylinder over what was left of the broken part.

"The cylinder I built up fitted nicely between the rest of the hinge. I ran a long, thin nail through one post, through the cylinder of plastic metal, and then through the hole in the other post. Except for occasionally rotating the nail so it wouldn't stick to the plastic aluminum while it was hardening, I kept hands off for a few hours until my repair was actually hard.

"Result? The hinge worked perfectly . . . and, as far as I know, it's still working."

I guess two facts sum up the story on aluminum putties like Duro Plastic Aluminum: They're easy and they work. Made with Alcoa® Aluminum Powders, they go on like paste, then dry to metal-like hardness in about three hours.

They adhere to metal, wood, plastic, glass or concrete . . . are not affected by water, oil or gasoline . . . can be burnished to a high luster or even painted. There's always a tube or two handy in my workshop.

Alcoa Brings You Action Drama At Its Best . . . "THE FBI," Sunday Evenings, ABC-TV.

Aluminum Company of America
914-M Alcoa Building,
Pittsburgh, Pa. 15219

Please send more information about cold solders made with Alcoa Aluminum Powders.

Name_____

Address_____

City_____ State_____ Code_____

ALCOA

Urheberrechtlich geschütztes Material

"Say, Smokey—"

A clinic on cars by America's most famous mechanic

Each month in POPULAR SCIENCE Smokey Yunick answers questions on cars—family cars, high-performance jobs, hot rods, and racing cars—selected from those sent in by readers. Got a problem? Ask Smokey. You'll find the address at the end of the column. Please *print* your name and address.

"I'm considering buying a sports car with wire wheels. I hear wire wheels are dangerous in hard corners and can never be balanced properly. Is this true?"

RICK JARMAN, Sarasota, Fla.

Yes. If you want to be different *and* safe, get magnesium or aluminum wheels—and make sure you get a good brand.

"When I bought my 1962 Corvair Spyder with turbocharger, it had 14,000 miles on it and produced 18.5 m.p.g. Upon changing spark plugs and installing the same type and heat range, mileage dropped to 12. A new condenser and points and carb overhaul didn't improve that. I put in a little hotter plug and got 14. Even Fire Injectors don't help. What can I do about this problem?"

BUD HARRIS, Washington, D. C.

Turbocharged engines are jetted rich. If too lean, a piston will get drilled quickly when crowded. That 18.5 m.p.g. was better than average, but I grant you something seems wrong. You may have lost some blower power. Have the turbocharger checked.

"I bought my '64 Buick Skylark new with factory-installed heavy-duty suspension. When it became necessary, I replaced with Delco Firm Ride shocks. This made the ride so rough that at 2,000 miles additional I put in Monroe regulars. They are good but not firm enough. Would you recommend adjustable shocks, or some other treatment?"

ROGER ROBESON, Macomb, Ill.

Engineers tune the shocks and springs to the car. Shop for shocks with exactly the same part number as the originals, and you will be back in tune. Other factors that could throw off the smooth original ride are any changes in the size, type, or pressures of the tires.

"How much should the heads on my '65 Rambler Ambassador with a 287-inch V-8 be shaved to gain power and economy without causing a rough idle?"

RALPH P. REYNOLDS, Steubenville, Ohio.

Up to .025 inches may be milled from the heads to gain you a little power and mileage. More than this can upset the engine balance, causing trouble with cam timing, distributor advance, and carb metering.

"My '62 Ford Galaxie with a 352-inch engine and automatic transmission is sluggish, with poor mileage, even though I keep the engine tuned to factory specs. Is this normal for this model?"

MARK RAJAKOVIC, Monessen, Pa.

This model isn't very ferocious in the power department. Neither is it an economy king. But if it's up to par, it should do better. Go a little deeper into the tune-up, and check the cam for wear or late running. Make sure the distributor advance is working right, and that the carburetor power-valve system is okay. Any of these out of whack could cause you trouble.

"Would it be harmful to add one pint of carbon tetrachloride to my crankcase oil a few minutes before an oil change to cut sludge and clean the engine?"

HARDING P. FEDDE, Kankakee, Ill.

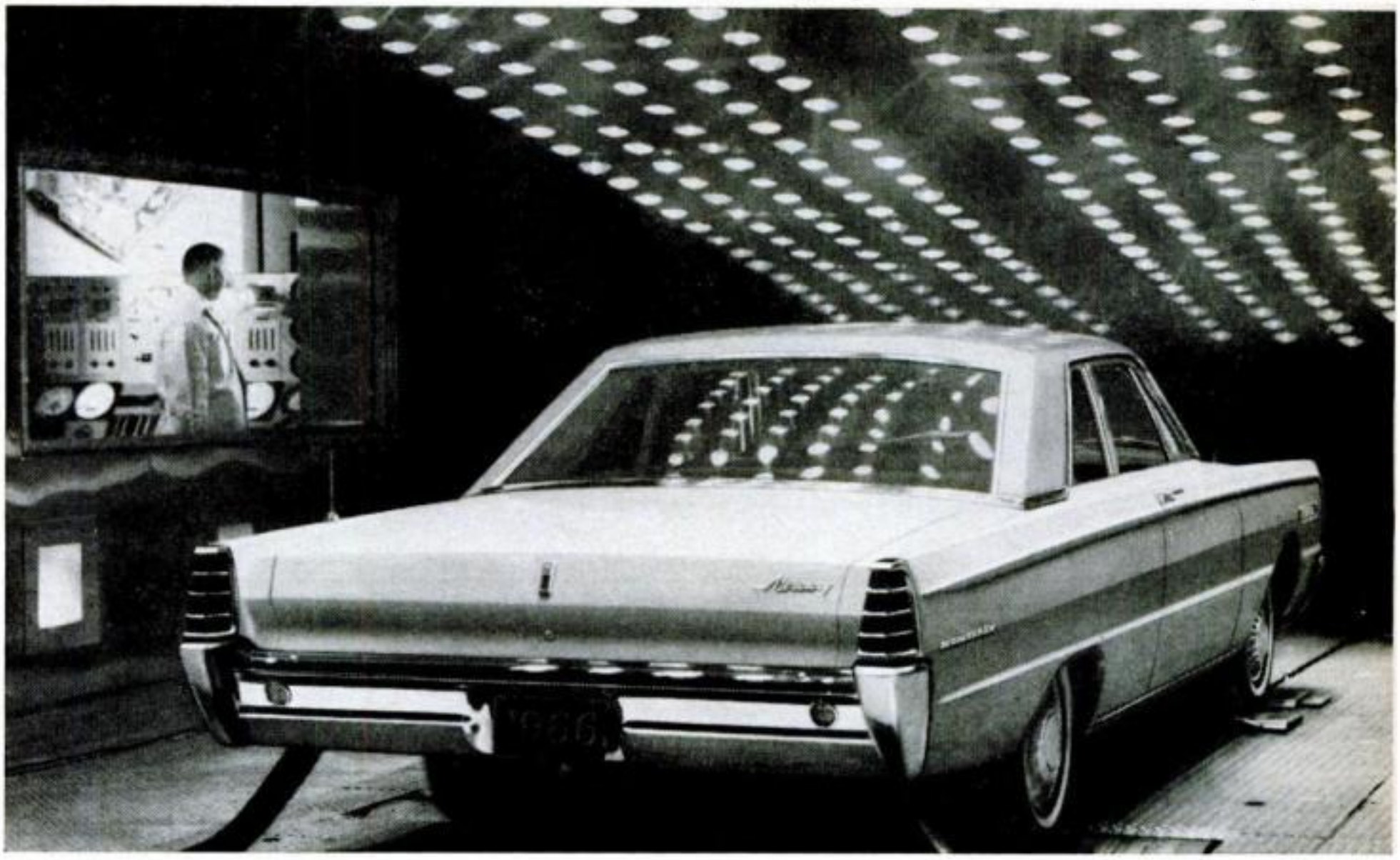
You're darned right! Stick to the chemicals developed for this purpose by the oil companies.

"The engine in my '62 Chevy stops when I drive over 60. By the time the car coasts to a stop, the engine fires up again. At other times the engine jerks along for a mile or two, then starts running smoothly again. I've replaced everything—points, plugs, coil, fuel pump, and carb,

Continued

Urheberrechtlich geschütztes Materi

Engine runs smoothly in desert heat! This test proves quality of the cooling and air-conditioning systems in Ford Motor Company cars. Keep the quality in your Ford-built car with Quality Car Care.



Ford Motor Company builds quality in– Quality Car Care keeps it in

QUALITY CAR CARE

Special equipment, like this stethoscope, helps Ford and Lincoln-Mercury Dealers to care for Ford-built cars. Add factory-trained mechanics, genuine parts, fair prices—that's Quality Car Care!

Now, a check on the road! Customer satisfaction is an important part of Quality Car Care, offered only by Ford and Lincoln-Mercury Dealers. They will make every effort to please you!

Only at FORD and LINCOLN-MERCURY DEALERS

Ford

Urheberrechtlich geschütztes Material

Not everyone does as well, but C. E. Nevin, who started a business of his own, reports...

—most of it Clear Profit for Me!

• Mr. Nevin expressed his grateful thanks for the opportunity to have a fine business of his own. Many men have discovered how to be independent, to be freed of bosses and layoffs—to build their own future on a steady, dependable foundation. G. Mundt made more than $400 one week. *A father-son combination grossed $33,000 first* year. H. Lemon says, "*I netted $133 in one 8-hour day.*"

How much you make depends largely on you. You need no special skill, no large investment. Start part-time if you wish. We will help you get started and work with you for your success. Training and consulting with experts is available at no additional cost.

No shop necessary • Our ELECTRIC RUG WASHER cleans rugs and carpets like new right on the floor... removes dirt and grime and helps to show their natural color and beauty. So efficient and safe for carpets, it is used by largest hotels and railroads.

Don't delay. Mail coupon today for complete information including how to start making big profits in YOUR OWN business. BIG opportunity.

Ours Is Not A Lease Arrangement • You are free to operate independently. *You* sign no contract. *You* own the deterger and are *your own* boss... every dollar *you* take in is *yours*. *You* pay no fees, or dues, or royalties, and enough supplies come with it to return far more than your investment. Many earn the cost of the deterger in a week or two. It costs nothing to get details... write TODAY.

Mail coupon today for interesting

FREE BOOK

VON SCHRADER MFG. CO.
W11 "R" PL., Racine, Wisconsin

Send at once (no obligation) your FREE booklet containing information about your ELECTRIC RUG WASHER and how I can start *my own* permanent, profitable business.

Name_____

Address_____

City_____ State_____ Zip_____

VON SCHRADER MFG. CO.

"Say, Smokey—"

[*Continued*]

and had the gas tank cleaned and a new line run to the engine. The wiring is okay. The Chevy mechanics say I'm not getting enough gas to the carburetor, but don't know why. Help!"

DAVID D. ENTERLINE, Gretna, Neb.

Install a temporary fuel-pressure gauge and observe the pressure at 60 to 70 m.p.h. If normal, and the engine quits, stop, kick the car out of gear, turn the key off, and remove the carb top. If the fuel level is low, you've got a feed problem. I would suspect pump trouble, despite what you have replaced up to now. If not fuel, take a good look at the distributor. Sometimes the ignition gets grounded when the distributor plate advances. If you wind up in despair, I'd suggest a good engine analyzer.

"Ever since I've had my '63 Olds F-85 with an aluminum-block V-8, I've had a seepage of antifreeze around all the bolts that hold the exhaust manifolds on the heads. How can I stop this?"

PETER J. GONOS, West Mifflin, Pa.

Get a Loc-Tite kit from your dealer. Pull out all the bolts and clean them thoroughly. Wash out the threads in the block holes with the kit's cleaning fluid. Apply the Loc-Tite on the bolt threads as per instructions and tighten down. This should fix you up.

"My '65 Mustang with a three-speed automatic transmission lurches when shifting from either Park or Neutral into Drive or Reverse. Once I get under way, the shifts are smooth in all gears. Idle speed checks normal with a tach. Dealers can give me neither a diagnosis nor a cure."

JACK PICOZZI, Albuquerque, N. M.

If your idle is okay, then the lurching comes from incorrect operation of the transmission's automatic controls. If the external adjustments check out all right, I'm afraid that you are in for a major—and possibly expensive—operation by a transmission specialist.

"I have a '63 Rambler Ambassador V-8 with overdrive. Just before I bought it, at 13,000 miles, the dealer replaced the clutch. Now the clutch is very hard to depress. Also, the linkage to the pedal seems frail for the pedal strength. What's wrong?"

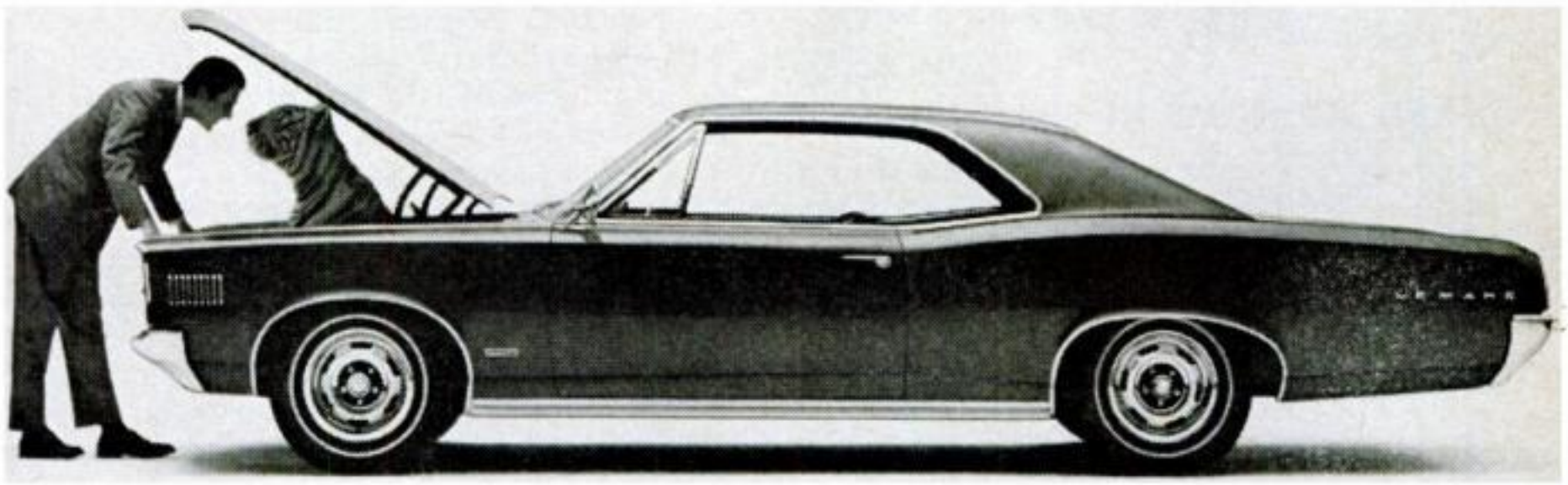
BOB SNOW, Cheyenne, Wyo.

The linkage could be out of adjustment, or freezing up. More likely, the wrong pressure plate for that model was installed. Another cause could be a clutch disk with too thick a lining. Better check for all of these.

"I'd like to swap the six-cylinder engine in my '59 Ford F-100 truck, with four-speed trans-

Continued

Urheberrechtlich geschütztes Material



Pontiac Motor Division . General Motors Corporation

Since when is a six a surprise? Starting right now.

So how does anybody turn a sweet, smooth, uninspiring six into an engine that goes around acting like a V-8? Brilliant engineering, mostly.

By putting the camshaft over the valves it operates, and connecting the two with a special cam follower pivoted on a zero-lash adjuster unit, the power-robbing weight of the pushrods, lifters, and rocker arms is eliminated. Zero-lash permits high rpm engine windup without valve float. Naturally, high rpm and low engine weight combine to produce a very agile power unit.

Our new six has only 15 cubic inches more displacement than the conventional pushrod engine it replaces, but 25 more horsepower. With the available sports package featuring a 4-barrel Quadrajet carburetor and split manifold, horsepower is increased by 42 to 207 at 5200 rpm.

Simplicity of design is another feature of this revolutionary powerplant. The overhead cam is driven by a specially compounded, nonstretch neoprene timing belt reinforced with glass-fiber cords. The same belt drives an accessory sprocket, which in turn drives the distributor, fuel pump, and oil pump as one external drive assembly.

Of course, the only way to evaluate an engine like this is to connect it to a particularly sensitive piece of road machinery—like the LeMans, Tempest Custom or Tempest on which it's standard—and drive it. The optional 207-hp sports package with heavy-duty shocks, springs, and stabilizer bar, and distinctive emblems and sport striping is available on the same cars. You can read more about it in the special performance cata log available from your Pontiac dealer. Ask him for one. The tiger scores again!

Wide-Track Pontiac/'66

Urheberrechtlich geschütztes Material

FREE!

Trial lesson in DRAFTING & DESIGN

LEARN AT HOME IN SPARE TIME

Check the want ads in any newspaper — SEE the big-pay opportunities open to you as a draftsman. What's more, you can learn this well-paid, prestige profession at home — quickly, easily! No special talent needed! Get complete, step-by-step Chicago Tech lessons in the mail, spend a few pleasant hours studying each week. In a short time you'll be a well-trained draftsman, ready to take your pick of many good jobs. Act now!

FREE INFORMATION—MAIL COUPON TODAY!

Get FREE TRIAL LESSON plus information about C.T.C. practical training. Learn what successful Chicago Tech graduates say about high pay and opportunities in drafting. No charge, or obligation.

Est. 1904 Accredited National Home Study Council

CHICAGO TECHNICAL COLLEGE

S-233 Tech Bldg., 2000 So. Michigan Ave.
Chicago 16, Illinois

Mail me FREE Lesson with information about big opportunities in DRAFTING.

Name..... Age.....

Address .....

City..... Zone..... State.....

SHOOT A STAPLE WHEREVER YOU'D DRIVE A NAIL!

ARROW

T-50 All-Purpose STAPLE GUN

Same Machine uses 6 Staple Sizes . . .

Available at Hardware, Building, Lumber and Stationery Dealers Everywhere

ARROW FASTENER CO., INC. 1 Junius St., Brooklyn, N.Y.

FUN TO BUILD—EASY TO FLY!

Bensen Copter—build with ordinary hobbyshop tools. Safest, easiest to fly. Plans, factory kits available. Get 3-View Drawings, specs, photo for $3, or simpler Gyroglider $2.

BENSEN AIRCRAFT CORP., Dept. PS-125
Raleigh-Durham Airport, Raleigh, N. C. 27602

NAME_____

ADDRESS_____

"Say, Smokey—"

[*Continued*]

mission, for a V-8. Can you suggest the best engine to install, involving the least amount of adapting, changing engine mounts, transmission housing, etc? I want to keep the box I have."

W. F. MAYS, Portsmouth, R. I.

That's an easy one to answer. Use the V-8 that Ford made for that model that year. Everything will fit nicely. Most of the recent V-8s Ford has put out will fit nicely, too.

"My 1965 Mustang 289-inch V-8 car has 5.95-by-14 tires. I'd like to put 7.50 snow tires on all around. Would this in any way damage the drive train? Is there something else I should know about such installations?"

CHARLES F. RAFFERTY, Albany, N. Y.

It's not going to hurt anything. In fact, snow shoes will make your Mustang more sure-footed under any road conditions. But why "all around"? Snow treads are for traction. Be sure to get the proper speedometer adapter so you'll know how fast you're going, and remember that the bigger tires will cost you something on the acceleration side.

"Most driving in my '64 Ranchero is done to and from work—about eight miles a round trip. Your POPULAR SCIENCE booklet, "Smokey Yunick's Car-Care Guide" [June], mentioned short-haul driving as one cause of sludge. Is there a way to prevent such sludging?"

R. J. KENNEY, San Jose, Cal.

Yes. Have frequent oil changes and a yearly crankcase flushout. Be sure the choke is on the lean side and that the heat riser works freely. When starting, warm the engine, giving it an extra minute or two. The thermostat should run up to 180 degrees. Now and then treat your wagon to a 30- or 40-mile run on the freeway in hard, steady driving. Sludge and varnish accumulate rapidly when there is not enough heat to remove the condensation and excess raw gas from the oil.

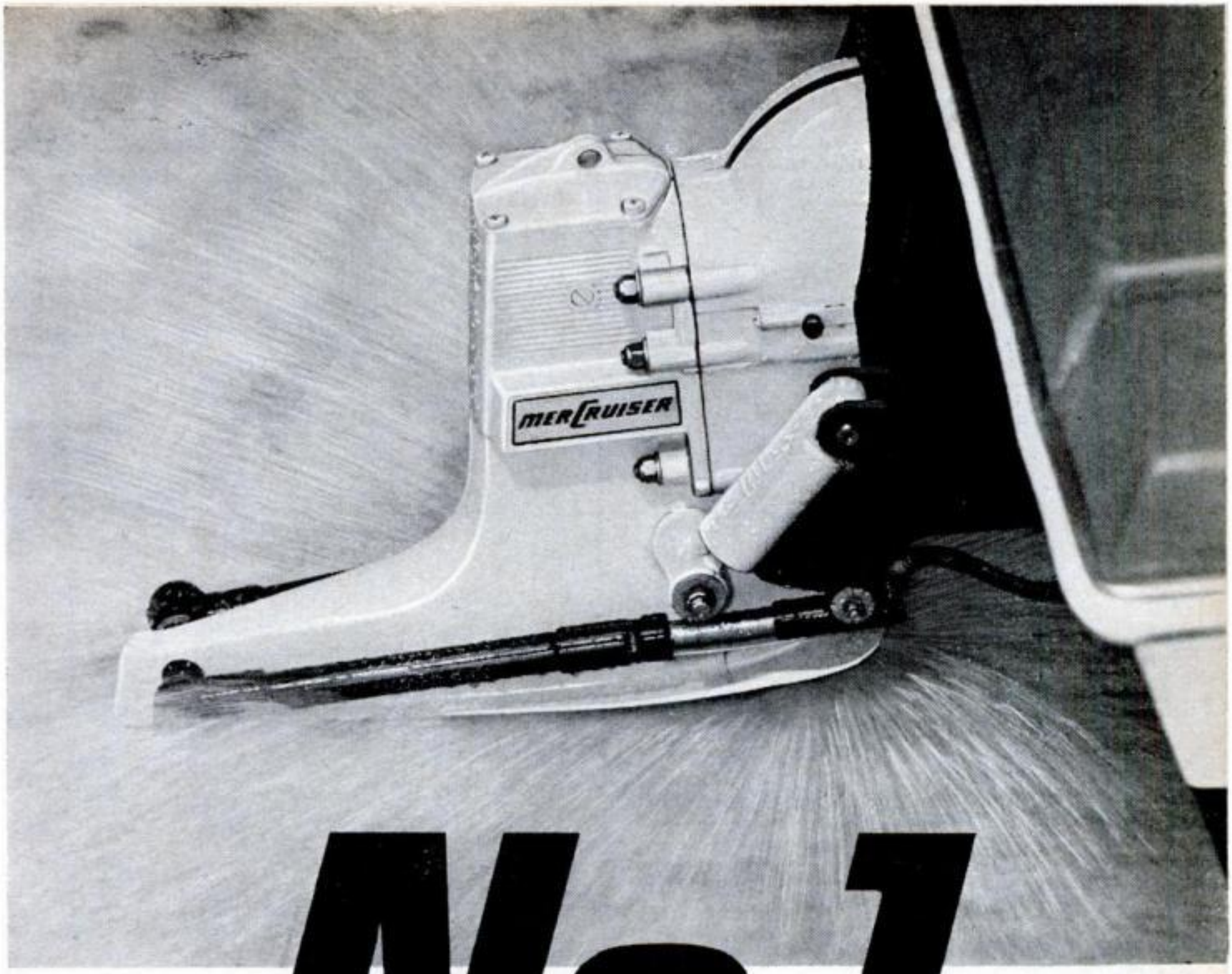
"If I put two 100-pound sacks of sand in my car trunk to assist traction on ice and snow, should they be placed over the rear wheels or the extreme rear of the trunk for the best traction?"

R. J. JOHNSTON, Perryton, Tex.

The farther back that you put the ballast, the more weight on the rear axle, but the less to the front. For proper maneuverability and control, try several positions.

Got a question on autos? Send it to:
"Say, Smokey—" POPULAR SCIENCE
355 Lexington Ave., New York, N.Y. 10017.
Not every question may be used. Questions cannot be answered by individual letters.

Urheberrechtlich geschütztes Material



No.1

More people buy MerCruiser than all other stern drives combined. Why?

Naturally, MerCruiser offers you all the popular advantages of a stern drive: inboard economy plus outboard maneuverability, portability and propulsion efficiency (propeller thrust is parallel to the plane of motion). But why does MerCruiser *outsell all other stern drives combined?* Start with the widest range of power ever offered — 8 models, 60 to 310 hp— including diesel power. Now add quiet that comes from features like rubber-mounted engine and Jet-Prop exhaust. Include impact protection like hydraulic shock absorbers which control kickup, shearproof propeller (no shear or drive pins) and automatic safety-tilt switch. And don't forget the widest selection of accessories in the stern drive industry, including single-lever throttle and shift control, Ride-Guide steering, fresh water cooling plus power steering, tilt and swivel. For more reasons why most of the stern drives going are MerCruiser, see your MerCruiser dealer! (60, 110, 120, 150, 170, 225 and 310-hp gasoline; 60-hp diesel.)

STERN DRIVE POWER PACKAGES

MERCRUISER

Kiekhaefer Corporation, Fond du Lac, Wisconsin and Kiekhaefer Mercury of Canada, Ltd., Subsidiary of Brunswick Corporation

Urheberrechtlich geschütztes Material

KEEP PACE WITH SPACE AGE! SEE MANNED MOON SHOTS, SPACE FLIGHTS, CLOSE-UP!

AMAZING SCIENCE BUYS for FUN, STUDY or PROFIT

EXCELLENT for XMAS GIFTS!

See the Stars, Moon, Planets Close Up!
3" ASTRONOMICAL REFLECTING TELESCOPE
60 to 180 Power—Famous Mt. Palomar Type! An Unusual Buy!

Equatorial Mount with lock on both axes. Aluminized and over-coated 3" diameter high-speed f/10 mirror. Telescope comes equipped with a 60X eyepiece and a mounted Barlow Lens. Optical Finder Telescope included. Hardwood, portable tripod. FREE with Scope: Valuable STAR CHART plus 272-page "HANDBOOK OF HEAVENS" plus "HOW TO USE YOUR TELESCOPE" BOOK.

Stock No. 85,050-N .....$29.95 Postpaid

4¼" Astronomical Reflector Telescope!
255 Power. New Vibration-Free Metal Pedestal Mount.
Stock No. 85,105-N .....$79.50 F.O.B.

Superb 6" Reflector Telescope
Up to 576 Power Equatorial mount and Pedestal Base
Stock No. 85,086-N.....$199.50 F.O.B.

Protect Glasses, Get Perfect Fit, Make Minor Repairs
NEW EYEGLASSES WEARER'S KIT HAS EVERYTHING

For Home, Car, Office Work Areas, Here's a completely different gift—new, compact 10 item Kit of handy "solve-it-fix-it" items provides everything for comfort, protection, convenience. Get perfect fit, prevent breakage, loss, fogging; keep your glasses sparkling clean; make minor repairs on the spot! Incl. instr., test charts, eye-care hints. **Stock No. 60,552-N.....$5.00 Ppd.**

OPAQUE PROJECTOR

Projects illustrations up to 3" x 3½" and enlarges them to 35" x 80" if screen is 6½ ft. from projector; larger pictures if screen is further away. No film or negatives needed. Projects charts, diagrams, pictures, photos, lettering in full color or black-and-white. Operates on 115 volt, A.C. current, 6-ft. extension cord and plug included. Operates on 60-watt bulb, not included. Size 12" x 8" x 4½" wide. Weight 1 lb., 2 oz. Plastic case with built-in handle.
Stock No. 70,199-N.....$7.95 Postpaid

OPAQUE PROJECTOR with KALEIDOSCOPE ATTACHMENT
Same unit as above, but provides endless additional projects with everchanging kaleidoscope patterns.
Stock No. 70-714-N .....$10.00 Ppd

Bargains Galore! Hours of Fun! Only $5

NEW POPULAR SCIENCE FUN CHEST

Here are Edmund's 9 top selling science toys and curiosities in one fascinating, low-cost package. Perfect gift item. Amuse and delight young and old for hours on end. Educational, too! Teach basic science principles in a wonderful new fun way. Incl.: Solar Radiometer—**spins at 3,000 rpms;** Albert the Bobbing Bird—**runs continuously on thermal energy; Amazing** Sealed Mercury Puzzle; **Five 2-sided** Ceramic Magnets; **Big 3½"** Burning Glass **in Zip-Lip Poly Bag;** Magnetic Doggie and Spinning Ball—**ball spins as dog approaches;** Diffraction Grating Rainbow Viewer; PICK-UP Ring **(with Edmund TAK); Popular booklet,** "Astronomy and You." **All in die-cut storage box with complete instructions.**
Stock No. 70,787-N .....$5.00 Postpaid

WAR SURPLUS ELECTRIC GENERATOR

Brand new Signal Corps Electric Generator for scientific experiments, electrical uses, demonstrations. Generates up to 90 volts by turning crank. Use in high impedance relays. Charge ground and bring up night crawlers for bait or study. 2 Amico Magnets alone worth original price. Wt. 2 lbs. Cost to Govt. $15
Stock No. 50,225-N .....$6.95 Postpaid
Same type generator, mounted, with light, as electricity demonstrator.
Stock No. 50,365-N .....$11.95 Postpaid

MAKE YOUR OWN POWERFUL ASTRONOMICAL TELESCOPE

Kits contain fine annealed pyrex mirror blank, abrasives, diagonal mirror and eyepiece lenses. You build instruments ranging in value from $75.00 to hundreds of dollars.

Stock No.	Diam.	Mirror Thickness	Price	
70,003-N	4¼"	¾"	$ 7.50 ppd.	
70,004-N	6"	1"	11.95 ppd.	
70,005-N	8"	1⅜"	19.50 ppd.	
70,006-N	10"	1¾"	30.75	f.o.b.
70,007-N	12½"	2⅛"	59.95	Barrington

MAIL COUPON for FREE CATALOG "N"

EDMUND SCIENTIFIC CO., Barrington, N.J.
Completely New 1966 Edition. 148 Pages.
Nearly 4000 Unusual Bargains
Please rush Free Giant Catalog-N.

Name.....

Address.....

City.....Zone.....State.....

'FISH' WITH A WAR SURPLUS MAGNET

Go Treasure Hunting On The Bottom

Great idea! Fascinating fun and sometimes tremendously profitable! Tie a line to our 5-lb. Magnet—drop it overboard in bay, river, lake or ocean. Troll it along the bottom—your "treasure" haul can be outboard motors, anchors, fishing tackle, all kinds of metal valuables. 5-lb. Magnet is war surplus—Alnico V Type—Gov't. Cost, $50. Lifts over 150 lbs. on land—much greater weights under water. Order now and try this new sport.

Stock No. 70,571-N 5 lb. Magnet.....$12.50 Postpaid
Stock No. 70,570-N 3½ lb. Lifts 40 lbs.....$8.75 Postpaid
Stock No. 70,572-N 7½ lb. Lifts 175 lbs.....$18.75 Ppd.
Stock No. 85,152-N 15 lb. size, lifts 350 lbs.....$33.60 FOB

WOODEN SOLID PUZZLES

12 Different puzzles that will stimulate your ability to think and reason. Here is a fascinating assortment of wood puzzles that will provide hours of pleasure. Twelve different puzzles, animals and geometric forms to take apart and reassemble, give a chance for all the family to test skill, patience, and best of all to stimulate ability to think and reason while having lots of fun.
Stock No. 70,205-N .....$3.00 Postpaid

EXPLORE THE FASCINATING WORLD OF MAGNETISM
NEW 23 MAGNET VARIETY KIT
11 Shapes! Many Compositions!

Ever ripen tomatoes by magnetism—paint pictures using magnet as a brush and iron filings as paint? Surprising new ideas and uses for the bewildering forces of magnetism are continually discovered. Here, in one low-cost kit, you can learn and experiment with varied materials that obsoleted Magnetite—the natural magnetic ore. Terrific assortment includes ferrites, ceramics, flexible rubber alnico in every shape imaginable—up to 20 lbs. pull. Used every day in the modern wonders of magnetic microphones . . . magnetic processing of bank checks . . . memory cores for electronic computers, flow meters, immense generators, transformers, motors, etc. All kinds of practical everyday uses, too. Make tool and knife holders, pick-up tools, bulletin boards, automatic stirrers, magnetic games and puzzles. Your own ingenuity can produce dozens of innovations—perhaps patentable. Sizes range from ¾" x 7/16" x 7/16" to 3" x 3" x 1/32". Incl.: three—2 sided ceramic, flexible strip, alnico bar, ceramic, alnico disc w/center hole, 2 lg., alnico cyl.; sm. cyl.; flex. sheet, 2 baby alnico bars, 3 enamel-type pole pieces for sm. ceramic magnets, bar magnet keeper, 2 disc magnet keepers, compl. info. and inst.
Stock No. 70,780-N .....$5.00 Postpaid

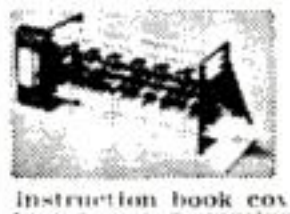
SCIENCE TREASURE CHESTS
For Boys—Girls—Adults

Science Treasure Chest—Extra-powerful magnets, polarizing filters, compass, one-way-mirror film, prism, diffraction grating, and lots of other items for hundreds of thrilling experiments, plus a Ten-Lens Kit for making telescopes, mircopes, etc. Full instructions included.
Stock No. 70,342-N .....$5.50 Postpaid
Science Treasure Chest DeLuxe—Everything in Chest above plus exciting additional items, for more advanced experiments including crystal-growing kit, electric motor, molecular model set, first-surface mirrors and lots more.
Stock No. 70,343-N .....$10.50 Postpaid

MINIATURE WATER PUMP

Wonderful for experiments, miniature waterfalls, fountains, Christmas gardens, HO gage railroad backdrops, hobbyists, labs, schools. Pumps continuous flow of water etc. Tiny (2⅝" x 1¾") electric motor and pump ideal for ho'bbyists, labs, schools. Pumps continuous flow of water at rate of one pint per minute at a 12" head. With 2 D Batteries in series will pump to 24" high. Works in either direction. **Stock No. 50,345-N.....$2.25 Postpaid**

SOLVE PROBLEMS! TELL FORTUNES! PLAY GAMES!
NEW WORKING MODEL DIGITAL COMPUTER
ACTUAL MINIATURE VERSION OF GIANT ELECTRONIC BRAINS



Fascinating new see-through model computer actually solves problems, teaches computer fundamentals. Adds, subtracts, multiplies, shifts, complements, carries, memorizes, counts, compares, sequences. Attractively colored, rigid plastic parts easily assembled. 12"x3½"x4¾". Incl. step-by-step assembly diagrams, 32-page instruction book covering operation, computer language (binary systems), programming, problems and 15 experiments.
Stock No. 70,683-N .....$5.98 Postpaid

BUILD A SOLAR ENERGY FURNACE

A fascinating new field. Build your own Solar Furnace for experimentation- many practical uses. Easy! Inexpensive! Use scrapwood! We furnish instructions. This sun powered furnace will generate terrific heat—2000° to 7000°. Fuses enamel to metal. Sets paper aflame in seconds. Use our Fresnel Lens 11" sq. F.L. 19".
Stock No. 70,533-N.....$6.00 Postpaid

ORDER BY STOCK NUMBER . SEND CHECK OR MONEY ORDER . SATISFACTION GUARANTEED
EDMUND SCIENTIFIC CO., BARRINGTON, N. J.

Urheberrechtlich geschütztes Material

Science Newsfront

Last-minute notes to keep you up to date

By W. STEVENSON BACON

Air-cushion trucks with wheels to carry transformers and generators for power stations, rockets bound for Cape Kennedy, tanks, or other heavy equipment may be in the making. Currently, highway loads are limited by the weight limits of bridges and roads. To get around this problem, Vickers Hovercraft Division of Vickers Armstrong is building an air-cushion assisted transporter for Britain's Central Electricity Generating Board. The loads—power-station equipment—will rest on beams suspended between two wheeled platforms. Air compressors mounted on the back of a truck supply air through hoses to an inflatable skirt underneath the load, effectively spreading its weight over the entire roadway. With the transporter, a 50-foot bridge designed for 150 tons could carry 225 tons, and a typical 25-foot span, 280 tons.

What makes your heart beat faster—Bach, Beethoven, or the Beatles? To find out, computer analysts and electronics engineers enlisted by Victor Alessandro, conductor of the San Antonio Symphony Orchestra, are planning to wire concert goers like astronauts to determine actual physiological reactions to different types of music in terms of blood pressure, heartbeat, and skin tone. In the first part of the project, being conducted this year, San Antonio audiences are being asked to express their enjoyment of each selection played by the orchestra by punching out holes on computer cards. In the "wired" tests to come, Alessandro hopes to measure the actual emotional response of the audience—what they enjoy with "feeling" as well as what they say they enjoy.

Dry paint applied electrostatically may one day beautify cars, furniture, and other objects, ending forever the need for messy liquid paints. According to Dr. A. W. Bright, reader in electrical engineering at Southampton University, Southampton, England, the possibilities of using electrostatically charged particles for painting, crop spraying, space propulsion, and other uses are practically unlimited. Dr. Bright is establishing an electrostatics laboratory at Southampton to further develop the technology.

True 3-D television and movies in which the image has depth, permitting the viewer to see behind an object, are two steps closer. The new advances are in the field of holography—a type of lensless photography done by laser light. To make a hologram, an object is illuminated by a laser. Part of the light is refracted by a prism onto a sensitized glass plate along with the light reflected from the object. Since laser light is coherent (all of one wavelength), an interference pattern is registered on the glass from which it is possible to recreate a three-dimensional image of the object by illuminating it with the same laser light source used to make it. One of the new developments, the work of Westinghouse physicists T. P. Vogl and A. K. Rigler, are holograms, made directly on ordinary photographic film, which "see" almost 360 degrees around an object. The other development, a hologram mirror, is made by depositing an extremely thin layer of aluminum on the surface of a conventional hologram. This eliminates the need to look through the hologram to see an image, since the mirror generates a clear, bright, 3-D picture.

An electronic pain killer, a five-ounce box with a button on the top, is being used by cancer patients to stop unbearable pain. The device, which generates nine-volt pulses, is carried in a pajama pocket and connected to two tiny electrodes implanted by surgery into the center of the thalamus, a part of the brain that serves as a relay for nerve pain signals. The "pain box," invented by Dr. Frank Ervin of Massachusetts General Hospital, can be controlled by the patient at will.

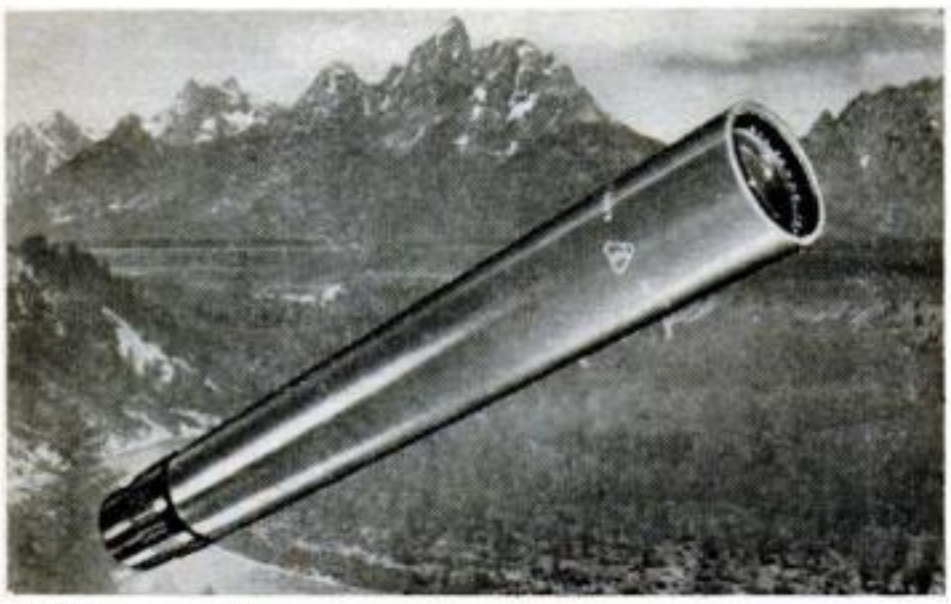
A radio powered by coconut juice is just one of the unbelievable—but practical—results of experiments now under way with biological fuel cells. The coconut-juice fuel cells, being researched as a jungle power source for the Army, can produce 150 watt-hours per pound of juice, according to engineers at Thompson Ramo Wooldridge, Inc. They've been used to operate a transistor radio for 50 hours over 45 days. The cells depend on the action of bacteria, *Aeromonas formicans*, which break down the juice into formic acid, generating electricity in the process. Sugar cane, fruits, and yams can also produce formic acid, and scientists are hoping to find that ordinary leaves and grass can also be used.

Insulation made from corn may keep your house warm, and your refrigerator or freezer cold. In research for the U. S. Department of Agriculture, cornstarch was used as the basis

Continued

Urheberrechtlich geschütztes Material

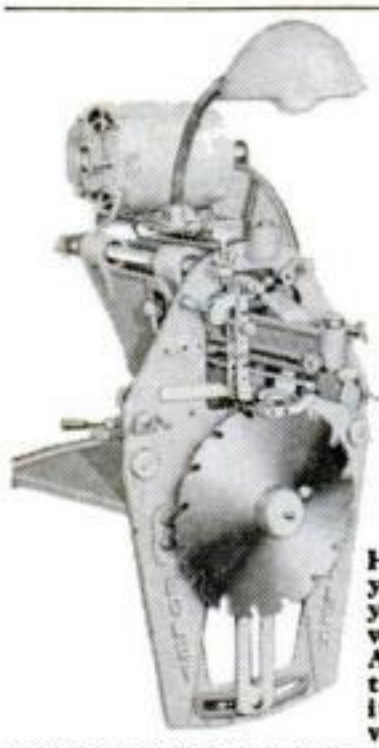
See into the next county and still stay put for only $9.95



High performance ten-power telescope

Think of all the interesting things you could see if only you had 10 times normal vision! You have — with the Balscope Ten for only $9.95! With its high-quality ten-power, 6-lens system, easy eyepiece focusing, 9-ounce weight and 10¼" length, it can go anywhere you go . . . or let you climb mountains from your porch! Accessory belt holster available at 98¢. At sports, optical and photo stores. Made only at Bausch & Lomb, Rochester, N.Y. 14602.

BALSCOPE TEN
by BAUSCH & LOMB



MAKE $20 to $30 A WEEK EXTRA MONEY

Here's a practical way to increase your income and build security for your family. Earn extra money every week sharpening saws with a Foley Automatic Saw Filer. You can actually build your own business with it—without special training or previous experience.

TURN YOUR SPARE TIME INTO CASH. Make from $3 to $6 an hour evenings, week-ends. Start in your basement or garage. No canvassing. *"I advertised in our local paper and got in 83 saws"—says M. L. Thompson.* Every saw you sharpen with the Foley Filer brings you more customers. Hundreds are making extra money this sure, fast, easy way. You can too.

FREE BOOK SHOWS YOU HOW TO START

"Money Making Facts" explains how you can get business from home owners, farmers, carpenters, schools, factories, etc., how to build your business and expand—every step of the easy way. Don't wait. Mail coupon now for this exciting book and easy pay plan. No salesman will call.

MAIL COUPON FOR FREE BOOK

FOLEY MANUFACTURING CO.
1249-5 Foley Bldg., Minneapolis 18, Minn.
Rush free book, "MONEY MAKING FACTS", and details on easy pay plan.

Name_____
Address_____
City_____ State_____

for polyethers to be made into rigid urethane-foam insulation. The cornstarch product can be made for about 15 cents a pound in a plant producing 10 million pounds a year—an amount requiring 100,000 bushels of corn. The insulation has the strength, flame resistance, and other properties of commercially available foam insulations, and would be comparable in cost.

Plastic ceilings and walls, furniture, room dividers and other articles made of acrylic—clear or translucent in a choice of colors—are distinct possibilities with the development of a low-cost method of making the material. Until recently, acrylic plastic—a thermoplastic material with mechanical and physical properties superior to most plastics—could be produced only by casting individual pieces or by an inferior extrusion process. A huge new casting machine, developed by Swedlow, Inc., Garden Grove, Calif., can now produce continuous sheets of cast acrylic up to 96 inches wide.

A "liquid metal" generator has—for the first time—produced usable amounts of alternating current. The device, a magnetohydrodynamic (MHD) generator, uses the electromagnetic induction principle for generating electricity by passing a moving conductor, a heated liquid metal, through a magnetic field. Since it has no mechanical moving parts, it can generate electricity at efficiencies of 70 percent or better—a big improvement over other types of generators. The AC MHD unit was developed by Atomics International division of North American Aviation for the Edison Electric Institute.

Strange new "drugs" called "pacifarins" by their discoverer, Dr. Howard A. Schneider of the Institute for Biomedical Research of the American Medical Association, may be among the most potent disease fighters ever found, equaling or surpassing penicillin in their importance to medicine. Pacifarins work on an entirely different principle than other drugs: Rather than rallying the body's defenses like vaccines, or destroying the disease organisms like penicillin, the new substances make it possible for the body to live indefinitely with the disease organisms by giving it a kind of natural resistance. The first pacifarins—effective against mouse typhus—have been found in wheat and dried egg whites, and it is hoped that pacifarins can be found for all, or most, human diseases.

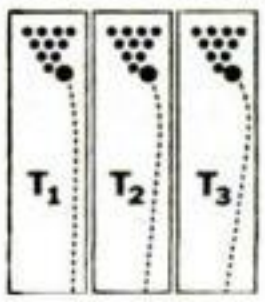
More than one plane crash may have been caused by the "normal" water content of jet fuel. The water—impossible to eliminate—causes icing in aircraft fuel lines when it's cold, and promotes the growth of microorganisms that clog fuel tanks and cause corrosion when

Continued

Urheberrechtlich geschütztes Material

what to get for "old hard-to-get-for"

Just slip a Brunswick Bowler's Gift Certificate into his Christmas sock. They start at $4.95. Then he can pick whatever piece of Brunswick bowling equipment strikes his fancy. May we suggest our new Trac-Master. Even if he already has a ball, he'll appreciate a Trac-Master. It's the only bowling ball with a choice of 3 hooking potentials.



Or, he can choose a new bowling bag, or a new pair of bowling shoes. What's that? He's a she? No problem. Brunswick makes bowling equipment for the gals, too. Very smart, sensibly priced. And have a Merry Christmas.

Brunswick
THE NO. 1 NAME IN BOWLING

SEE YOUR PRO DEALER

Urheberrechtlich geschütztes Material

Own a Business

You now have an opportunity to double your income in your own business. A big 24-page book tells how others start in spare time—then expand to a full time operation. Gross hourly profit $9.00—PLUS $6.00 additional on each service man. Income unlimited.

In this business your service is Nationally Advertised. It's a business that's world-wide and endorsed by McCall's and Parents' Magazine. You need no experience—no shop. We show you how and finance you for all but a few hundred dollars. Easy to learn—easy to do—easy to build up to a good, steady volume on our 15 tested ways to get customers.

G. F. Monroe, after 12 months, sold his business for 10 times his cost. Leo Lubel sold his for $7,116 more than he paid. L. Babbit writes, "I average $2,600 monthly, part time." W. C. Smith earned $650 in one week. Ed Kramsky said, "In two years I have two assistants, a nice home and real security."

This may be the opportunity of your life. **Find out today** before someone else gets your location. Mail the coupon now for full details and 24-page illustrated free book. No obligation. No salesman will call. Mail coupon now before it's too late to get territory.

DURACLEAN COMPANY,
5-18D Duraclean Building, Deerfield, Illinois 60015

Please send me your 24-page illustrated book that tells how I can double my income in a business of my own. Everything you send me now is free and I am under no obligation. No salesmen will call.

NAME_____

ADDRESS_____

CITY_____

STATE_____ ZIP CODE_____

DO YOU WORK WITH COLD ALL DAY FEET?

Now at last a new modern, low priced electric foot warmer that will keep you healthy, happy and comfortable.

HELP PREVENT COLDS WITH... ELECTRO-MAT

Check stand cashiers, secretaries, assembly line workers, housewives, office workers, theatre cashiers, machine operators, telephone operators, and many others throughout the country are now singing the praises of the Electro Mat. There is no further need to work all day with cold feet.

Size 14" x 21" lightweight, portable
Consumes less power than a 100 watt light bulb.
Mail your check or money order today for ONLY

$8.95 Delivered

Safe and Economical • 12 Month Guarantee

INTERSTATE RUBBER PRODUCTS CORP.
908 Avila St. Dept. 509 Los Angeles 12, California

Please send me_____ Electro Mats at $8.95 each.
IMPORTANT SAVING:
If 6 or more ordered, price is only $7.95 each.
☐ C.O.D. Enclose $1.00 deposit with order.
☐ Prepaid

Name_____

Address_____

City_____ State_____

Science Newsfront
continued

it's warm. Purely by accident, a single answer has been found to both problems. A mixture of ethylene glycol monomethyl ether and glycerol was developed for the Air Force to combat the icing. It was discovered that the same mixture also acts as a biocidal agent, keeping the tanks clean, by Hoffman-Taff, Inc., commercial producers of the additive.

Simple, efficient atomic batteries that convert nuclear energy directly to electricity are being developed by University of Illinois researchers G. H. Miley and H. T. Sampson. In one type, two electrodes—one of which is coated with a thin layer of uranium fuel—are enclosed in a vacuum housing. Fission occurs in the fuel when it is bombarded with neutrons from an outside source, and some of the fission fragments cross the vacuum gap to the uncoated electrode, giving it a positive charge. In a second battery, gamma radiation scatters electrons in an insulator between two electrodes; these are collected by the negative, or collector, terminal. Although neither device is likely to replace the flashlight cell, they would be economical power sources in fuel-poor communities, or in outer space.

Man-made "suns" may light underground or underwater mines or work areas of the future. The solar simulators were designed by RCA to test solar cells and other components for space vehicles, paints, fabrics, plastics, dyes, and other materials that fade and deteriorate when exposed to natural sunlight. They emit light with exactly the same properties as that of the above-atmosphere sun. Method: A complex optical system collects the light generated by carbon-tungsten arcs, and focuses it into a sunlight-like beam.

Creation of life in a test tube—long the dream of biologists—appears closer than ever before to accomplishment. A virus-like matter capable of infecting living cells and multiplying inside them has been created by Dr. Sol Spiegelman and his associates at the University of Illinois. In other research, two of the five basic building blocks of genetic material—called nucleotide molecules—were linked together under conditions resembling those of the earth millions of years ago by Dr. Cyril S. Ponnamperuma, chief of the chemical evolution branch of NASA's Ames Research Center. Among the things that could come from the ability to make life, according to Dr. Charles C. Price, president of the American Chemical Society, are the synthesis of food, fiber, drugs, and forms of living matter completely unknown today. Dr. Price recently called for a 20-year "Manhattan Project" to synthesize life. PS

Urheberrechtlich geschütztes Materia

TWO TICKETS TO SUCCESS

Why two? One for you and one for a friend. For as more men and women decide to seek a happier, more successful life, it's important that they learn about I. C. S.—the largest, oldest school of its kind!

Choose the course that will help you gain the position, money, respect you seek in life. Learn bedrock facts and theory from the school that has trained more than 7,000,000 men and women. Get the respected I. C. S. diploma!

If you don't find the course you need in this partial listing, write it in where indicated on the coupon. Chances are I. C. S. has it!

Mark and mail the I. C. S. coupon—your ticket to success. Encourage a friend to send the other if you like. By return mail you will receive, absolutely FREE, 3 valuable booklets that have helped thousands. No obligation—act now!

ARCHITECTURE and BUILDING TRADES
Air Conditioning
Architecture
Arch. Drawing
Building Contractor
Carpentry & Millwork
House Planning
Painting
Plumbing & Heating

ART and DESIGN
Commercial Art
Interior Decorating
Magazine Illustrating
Show Card & Sign Painting
Sketching and Painting

AUTOMOTIVE
Auto Body Rebuilding
Auto Electrical Technician
Automobile Mechanic
Engine (Gas & Diesel)
Engine Tune-up
Transmission Specialist

AVIATION
Aero Engineering
Aircraft Drafting
Aircraft Mechanic

BUSINESS
Accounting
Cost Accounting
Public Accounting
Bus. Administration
Executive Training
Mgmt. Accounting
Marketing
Personnel-Labor Relations
Programming for Digital Computers
Purchasing Agent
Real Estate
Salesmanship
Sales Mgmt.
Small Business Mgmt.
Traffic Mgmt.

CHEMICAL
Analytical Chemistry
Chem. Engineering
General Chemistry
Chem. Lab. Technician
Nuclear Energy
Plastics
Pulp, Paper

CIVIL ENGINEERING
Civil Engineering
Highway Blueprints
Highway Engineering
Structural Blueprints
Sanitary Engineering
Structural Engineering
Surveying & Mapping

DRAFTING
Architectural
Drafting Technology
Electrical and Electronic
Mechanical

ELECTRICAL
Elec. Appliance Servicing
Electrical Engineering
Elec. Motor Repairman
Industrial Telemetering
Instrument Technician
Practical Electrician
Practical Lineman

ELECTRONICS
Automation
Basic Electronics
Electronic Computers
Electronics Technician
Hi-Fi Stereo and Sound Systems
Industrial Electronics

ENGINEERING (Professional)
Chemical
Civil
Electrical
Mechanical

ENGLISH and WRITING
Better Business Writing
Introductory Technical Writing
Short Story Writing
Practical English

HIGH SCHOOL (Diploma)
High School General
High School Math
High School Secretarial
High School Vocational
College Preparatory

LANGUAGES
(Edited by Berlitz)
French
German
Italian
Spanish

MECHANICAL and SHOP
Gas and Electric Welding
Industrial Engineering
Industrial Instrumentation
Machine Design
Machine Shop Practice
Mechanical Engineering
Reading Shop Blueprints
Tool Design
Toolmaking
Safety Engineering

SECRETARIAL
Clerk-Typist
Professional Secretary
Shorthand
Stenographic
Typist

STEAM and DIESEL POWER
Boiler Inspector
Power Plant Engineering
Stationary Diesel Eng'g
Steam Engineering

SUPERVISION
Foremanship—Suprv'n
Personnel—Lab. Rel'ns

TV-RADIO
Radio and TV Servicing
Radio-Telephone License
TV Technician
Practical Radio-TV Engineering

MISCELLANEOUS
Textile
Other (please specify)
_____

...MAIL YOURS TODAY!

INTERNATIONAL CORRESPONDENCE SCHOOLS ICS

Use one coupon—give the other to a friend **I.C.S., Scranton, Penna. 18515** **Accredited Member National Home Study Council**

ICS Dept. 1306, Scranton, Pa. 18515
(In Canada: I.C.S. Canadian, Ltd. In Hawaii: P.O. Box 418, Honolulu)
Please send me your free three-booklet career kit.
Name _____
Age _____ Home address _____
City _____ State _____ Zip Code _____
Area of interest _____
Occupation _____
Working hrs. _____ Employed by _____
Special low rates to members of U.S. Armed Forces

ICS Dept. 1311, Scranton, Pa. 18515
(In Canada: I.C.S. Canadian, Ltd. In Hawaii: P.O. Box 418, Honolulu)
Please send me your free three-booklet career kit.
Name _____
Age _____ Home address _____
City _____ State _____ Zip Code _____
Area of interest _____
Occupation _____
Working hrs. _____ Employed by _____
Special low rates to members of U.S. Armed Forces

Urheberrechtlich geschütztes Material

FREE

GIANT NEW CATALOG

100's OF BARGAINS NOT IN ANY OTHER CATALOG
1966 ANNUAL CATALOG
RADIO · TV · ELECTRONICS
TUBES PARTS ETC. AT LOWEST PRICES
TOP VALUES IN POWER & HAND TOOLS
EVERYTHING IN HI-FI AND STEREO
B-A
SINCE 1927
SAVE ON CAMERAS FILM & PHOTO EQUIPMENT
SAVE UP TO 50% ON CHOICE KITS

100's OF BIG PAGES CRAMMED WITH SAVINGS

BURSTEIN-APPLEBEE CO.

Dept. PS, 1012 McGee, Kansas City, Mo. 64106

☐ Rush me FREE 1966 B-A Catalog.

SEND FOR IT TODAY

Name .....

Address .....

City ..... State .....

Please be sure to show your Zip No. .....

FREE

MUSTANG HORN

WHINNIES like a WILD MUSTANG!

New electronic development imitates the sound of a wild mustang stallion. A fine product of a famous horn manufacturer. Complete with horn button control. For either 6 or 12 volt operation (specify).

☐ $14.95

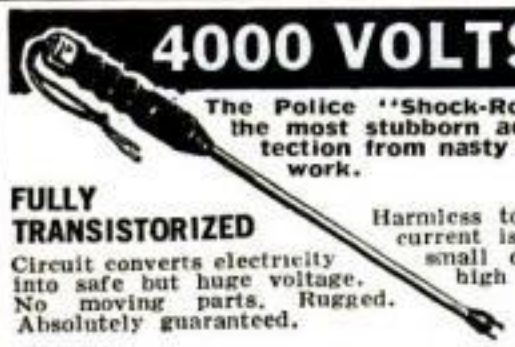
☐ 2 for $14 ea.

☐ 6 for $12 ea.

ALL PRICES POSTPAID

(ALL TYPES OF HORNS IN OUR CATALOG—MUSICAL—FOG—COURTESY CHIMES—WOLF CALL—BULL BELLOW—)

4000 VOLTS at the End of a 10-oz. 29" Cane



The Police "Shock-Rod" has power to control the most stubborn adversary . . . is ideal protection from nasty dogs. Also effective in riot work.

SAFE TO USER

FULLY TRANSISTORIZED

Circuit converts electricity into safe but huge voltage. No moving parts. Rugged. Absolutely guaranteed.

Harmless to adversary. The current is tiny (from two small c-size cells) but high voltage gives kick. Shorty Model same price as regular walking stick.

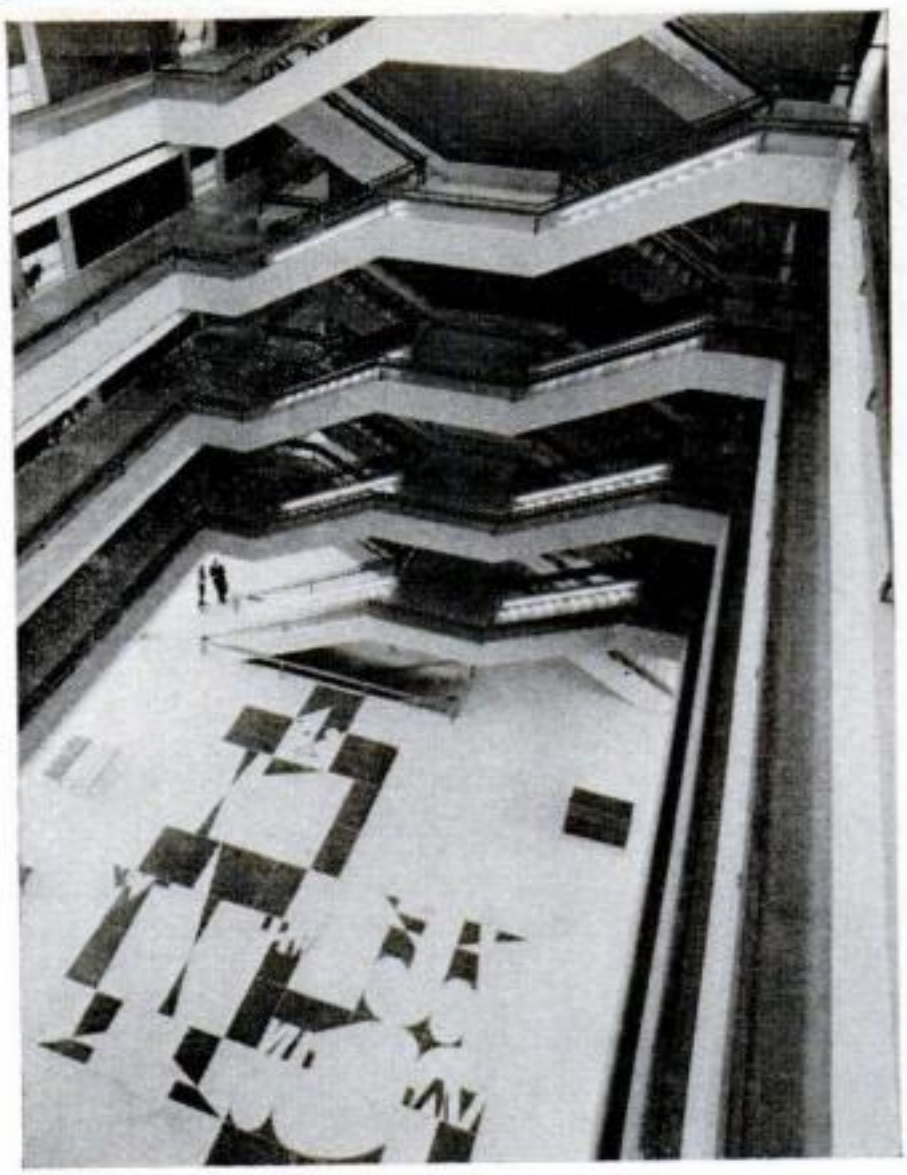
$14.95 ppd. **2 for $27**

Bats., Inc.

COUNTRY CLUB AUTOMOTIVE

Dept. Dolores, 210 W. 8th St.

KANSAS CITY, MO. 64105



Swiss open new modern school

This striking interior view is one already familiar to hundreds of youngsters in Bern. The ultramodern grammar school is four stories high, with classrooms on each floor opening off balconies that surround a central assembly hall. Designed to accommodate 900 pupils in 20 classrooms, the school cost nearly $4 million.

How to read maps in the dark

The binoculars on the hard hat above are equipped with an infrared transmitter and receiver to enable a man to see at night. The system, similar to that used by the U.S. Army, was developed by the British Ministry of Aviation's Signals Research Center. With it in place, the wearer can read maps and road signs in the dark.

Urheberrechtlich geschütztes Material

Move Up Faster — Make More Money With N.T.S. "PROJECT METHOD" HOME TRAINING

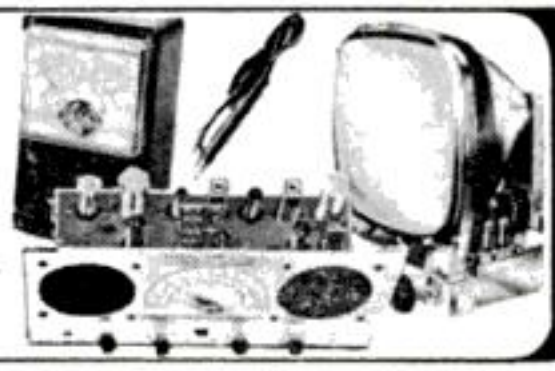
Looking for your first real job in industry? Are you stalemated in a dead-end job? Or, are you being left behind because you're not up on new industry methods? Don't let technical progress — automation — pass you up. There's an N.T.S. Project Method training program to help you MOVE UP FASTER and MAKE MORE MONEY!

N.T.S., a leading technical school for more than 60 years, **shop-tests every lesson and manual.** Easy-to-follow lessons are fully illustrated so you can learn **fast.** Look over the big opportunity home study courses below. Choose your field! Check the coupon and mail it today! You'll soon be on your way to a high-paying new career!

ELECTRONICS DIVISION

1. Electronics-TV-Radio Servicing and Communications
2. Master Course in Electronics-TV-Radio Advanced TV and Industrial Electronics
3. FCC License Course
4. Radio Servicing (AM-FM-Transistors)
5. Television Servicing (Including Color)
6. Stereo, Hi-Fi and Sound Systems
7. Basic Electronics
8. Electronics Math

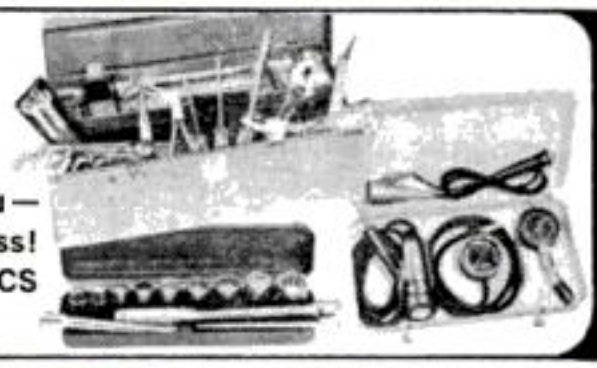
Train yourself quickly for America's "big future" industry! BIG EQUIPMENT KITS come with many of the electronics courses — at NO EXTRA COST! NO KIT DEPOSITS REQUIRED — equipment is included with your tuition.



AUTO-MECHANICS DIVISION

1. Automotive-Diesel Master Course
2. Automotive Mechanics
3. Diesel Mechanics
4. Engine Tune-up and Electricity

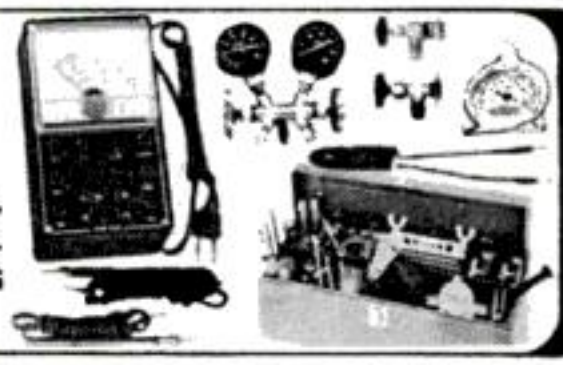
Eighty million cars and trucks need maintenance! Here's opportunity for you — in manufacturing, in sales and service — in your own auto repair business! VALUABLE TOOLS AND EQUIPMENT COME WITH ALL N.T.S. AUTO-MECHANICS COURSES! NO KIT DEPOSITS REQUIRED — NO EXTRA COST!



AIR CONDITIONING — REFRIGERATION DIVISION

1. Air Conditioning-Refrigeration Servicing Course
2. Air Conditioning, Refrigeration & Electrical Appliances Master Course

Good income in installation & servicing homes, factories, schools, hotels & motels, office buildings, stores, cars, trains, buses and in servicing electrical appliances. The trained man in these fields is in demand! BOTH COURSES COME WITH BIG EQUIPMENT KITS AT NO EXTRA CHARGE. NO KIT DEPOSITS REQUIRED.



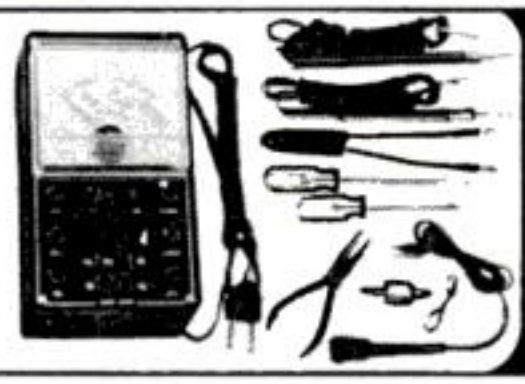
HIGH SCHOOL AT HOME

National offers accredited high school programs. Take only subjects you need. Study at your own pace. Everything included at one low tuition. Check special High School box in coupon for full information and FREE catalog.

HOME APPLIANCES DIVISION

1. **Home Appliances Master Technician's Course.** Prepares you quickly for a business of your own in all phases of major and small appliance work.
2. **Home Appliances Servicing Course.** Prepares you for a part or full time job. Earn while you learn.

No kit deposits required. No extra cost.



Classroom Training at Los Angeles.

You can take classroom training at Los Angeles in Sunny Southern California. N. T. S. is the oldest and largest school of its kind. Check Resident School box in coupon for details.

SEND FOR FREE BOOK & SAMPLE LESSON

CHECK ONE ONLY

NATIONAL TECHNICAL SCHOOLS

WORLD-WIDE TRAINING SINCE 1905

4000 S. Figueroa Street, Los Angeles, Calif. 90037

YOU ENROLL BY MAIL UNDER N.T.S. "NO OBLIGATION PLAN." WE HAVE NO SALESMEN; THIS MEANS LOWER TUITION FOR YOU.

Accredited Member National Home Study Council

NATIONAL TECHNICAL SCHOOLS

WORLD-WIDE TRAINING SINCE 1905

NATIONAL TECHNICAL SCHOOLS, DEPT. 202-125
4000 S. Figueroa St., Los Angeles, Calif. 90037

Please rush FREE BOOK AND SAMPLE LESSON on Courses in the Division checked below. No obligation — No salesman will call.

- ☐ ELECTRONICS Division
- ☐ AUTO-MECHANICS Division
- ☐ AIR CONDITIONING-REFRIGERATION Division
- ☐ HOME APPLIANCES Division
- ☐ HIGH SCHOOL Department

Name_____ Age____

Address _____

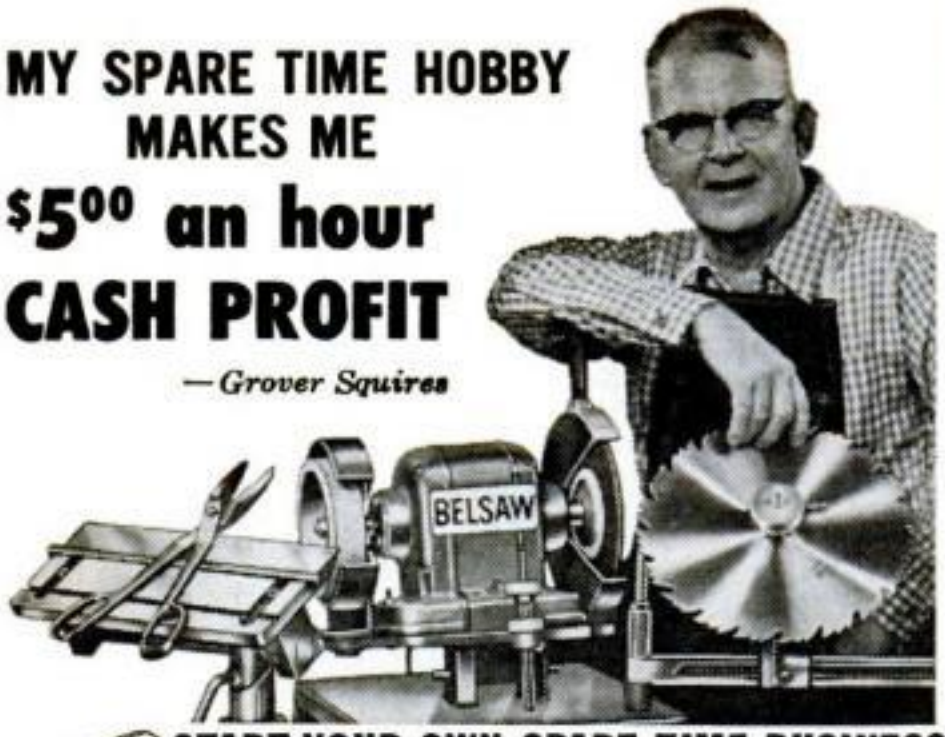
City_____ State_____ Zip_____

☐ Check here if interested ONLY in classroom training at Los Angeles.

Urheberrechtlich geschütztes Material

MY SPARE TIME HOBBY MAKES ME $5.00 an hour CASH PROFIT

—Grover Squires



START YOUR OWN SPARE TIME BUSINESS

You can turn your spare time into Big Cash Profits with your own **COMPLETE SHARPENING SHOP** . . . Grind saws, knives, scissors, skates, lawn mower blades . . . all cutting edges. Your Own Cash Business with no inventory . . . right at home . . . no experience needed.

FREE BOOK tells how you can start your own spare time business while you are still working at your regular job. Low Cost — time payments only $15.00 a month. **Send coupon today.**

FREE BOOK

BELSAW SHARP-ALL CO., 706F Field Bldg., Kansas City 11, Mo.
Send Free Book "LIFETIME SECURITY". No obligation.

Name_____

Address_____

City_____ State_____

to your own doctor's prescription

EYEGLASSES BY MAIL AT GREAT SAVINGS!

Mail orders filled by licensed opticians from **$9.95** (including frame, lenses and case)

Your doctor's prescripton will be filled by a skilled, approved and licensed Optician or your own prescription duplicated. Lenses are ground and manufactured to United States optical standards. Choose from complete catalog of men's, women's and children's glasses. Bifocals, trifocals, SUNGLASSES or Safety Hardened Lenses at low additional cost. We unconditionally guarantee accuracy and perfect fit.

SEND FOR FREE CATALOG TODAY

PRISM OPTICAL INC.
Dept. PS-13 136 Liberty St., New York 6, N.Y.

PS PICTURE NEWS

Pedaling up the side of a building

Pushing pedals like a bicycle rider, a workman in Germany can climb the sides of buildings like a fly for cleaning and other jobs on the façade. The machine is held by a three-point winch that operates on a chain and sprocket to a height of 150 feet. It carries a man, buckets of paint, or other tools, leaving both of his hands free for the job.

Service station rolls to customers

When a main industry in Borger, Tex., went over to automation and reduced its working force by 1,300, the change didn't faze Roy Dietz, service-station operator. He mounted 55- and 110-gallon tanks and pumps and an air compressor on a truck, added canned oil, and batteries, and goes to his old customers who no longer drive into town to come to him.

Urheberrechtlich geschütztes Material

PUL[illegible] PROFITS · TRIMMING TREES · CLEARING LAND ·
[illegible]TS · BUILDING A CABIN · PRUNING ORCHARDS
[illegible]CES · CUTTING FIREWOOD · BUILDING A
[illegible]G OUTDOOR FURNITURE · BLAZING A TRAIL

On July 1, 1965, the new McCulloch MAC-10 Series made every other lightweight chain saw overweight and out-of-date

MAC 1-10: The world's lightest direct drive chain saw. **10½ lbs.***
MAC 2-10: World's lightest automatic oiling chain saw. **10¾ lbs.***

If you know you need a chain saw to do any of the hundreds of wood cutting jobs one can do, now's the time to act. And if you've never thought about owning a chain saw, it's time to find out how handy a new, fast-cutting MAC-10 Series chain saw is to have around. The MAC-10 Series saws are up to one-quarter lighter than other lightweights, but have features and advantages that you'd expect only on much heavier saws. Larger capacity fuel and oil tanks, for instance, that keep MAC-10's running for a full half hour or even longer. A new, exclusive idle-governor that prevents stalling, and a fingertip primer that makes fast, sure starts. Extra strong internal parts, for long, dependable life. And, of course, the McCulloch trademark that is your guarantee of the best chain saw you can buy, any size, any price, for any job. Let your McCulloch Dealer show you the MAC-10's now. Or write for your full color McCulloch chain saw catalog: McCulloch Corp., Dept. PM, 6101 West Century Blvd. Los Angeles, California 90045.

Prices and specifications subject to change without notice or obligation.

*Engine weight only, dry, less bar and chain.

McCULLOCH
CHAIN SAWS · OUTBOARDS
LEADERSHIP THROUGH CREATIVE ENGINEERING

Urheberrechtlich geschütztes Material

AUDEL GUIDES

No. 8	**Carpenters & Builders Guide. 4 Vols.** 1900 pages	$10.50
No. 1	**Auto Mechanics Guide.** 1132 pages	6.00
No. 15A	**Electric Library. 10 Vols.** 5558 pages	25.00
No. 2	**Home Appliance Service Guide.** 832 pages	6.95
No. 14	**Refrigeration & Air Conditioning Guide.** 1090 pages	6.00
No. 26	**Masons & Builders Guide. 4 Vols.** 1440 pages	10.50
No. 6	**Plumbers & Steamfitters Guide. 4 Vols.** 1833 pages	10.50
No. 3	**Radio-TV Library. 2 Vols.** 960 pages	9.50
No. 12	**Machinists & Toolmakers Handy Book.** 1256 pages	6.95
No. 10	**Welders Guide.** 606 pages	4.95
No. 49	**Outboard Motor & Boating Guide.** 414 pages	4.00
No. 4	**Handy Book of Practical Electricity.** 1052 pages	5.95
No. 25	**Blueprint Reading for Mechanics & Bldrs.** 430 pgs.	3.95
No. 27	**Electric Motor Guide.** 1036 pages	5.95
No. 11	**Mathematics & Calculations for Mechanics.** 672 pages	4.95
No. 53	**Foreign Auto Repair Manual.** 592 pages	5.00
No. 5	**Truck and Tractor Guide.** 908 pages	5.95
No. 7	**Painting & Decorating Manual.** 592 pages	4.95
No. 48	**Gas Engine Manual.** 468 pages	4.00
No. 28	**Oil Burner Guide.** 420 pages	3.95
No. 9	**Diesel Engine Manual.** 544 pages	6.00
No. 29	**Sheet Metal Pattern Layouts.** 1152 pages	7.50
No. 54	**Programmed Basic Electricity Course.** 272 pages	4.00

10 DAY FREE EXAMINATION. SEND NO MONEY. We'll send you any Audel Guides for FREE trial. If you decide to keep the books you pay only $3 per month under our easy-pay plan. Simply circle the books you want below and we'll send them at once. If you're not completely satisfied, return them to us.

THEODORE AUDEL & CO. • Since 1879 S-125
4300 W. 62nd St., Indianapolis, Indiana 46206

MAIL COUPON TODAY!

Please mail me for 10 days FREE EXAMINATION the books circled below. I agree to mail $3 in 10 days for each book or set ordered, and to mail $3 a month for each book or set, until I've paid the purchase price, plus shipping costs. If I'm not completely satisfied with my Audel Guides I may return them.

Name _____

Address _____

Employed by _____

1 2 3 4 5 6 7 8 9
10 11 12 14 15A 25 26
27 28 29 48 49 53 54

☐ **SAVE SHIPPING COSTS.** Check here if you enclose complete payment (plus sales tax, if any). We pay postage.

☐ I've bought Audel books before.

STOP ERRORS WITH **SCREW CHEK'R**

CHECKS:

- MACHINE SCREWS
- WOOD SCREWS
- SHEET METAL SCREWS
- SELF-TAPPING SCREWS
- DRIVE SCREWS
- STANDARD RIVETS

TELLS:

- SIZE
- THREADS PER INCH
- LENGTH
- DIAMETER
- TAP SERIES
- BODY DRILL SIZE
- TAP DRILL SIZE

ONLY **$3.98** WITH SCREW SHEAR, DRILL CHART & INSTRUCTIONS.

CUTS SCREWS TO LENGTH
STRAIGHTENS BENT SCREWS and BATTERED THREADS

3"x5" HARDENED STEEL, SATIN CHROME PLATED
SATISFACTION GUARANTEED—OR MONEY BACK

RUELLE BROS., Box 114, Ferndale 20, Mich.

Send us _____ Chek'rs (Remittance attached)

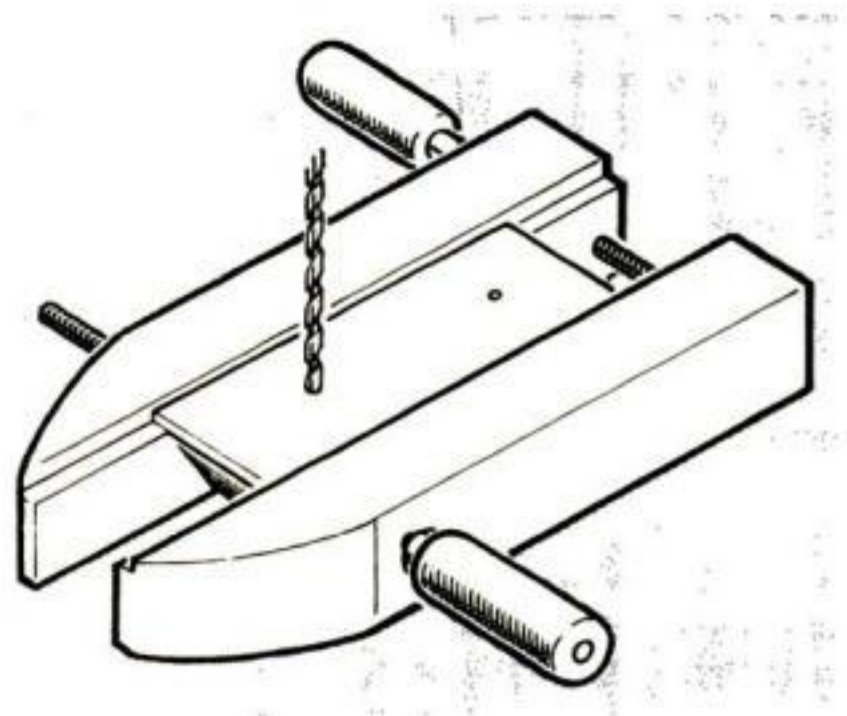
PS

(Name) _____

(Street Address) _____

(City) (Zone) (State) _____

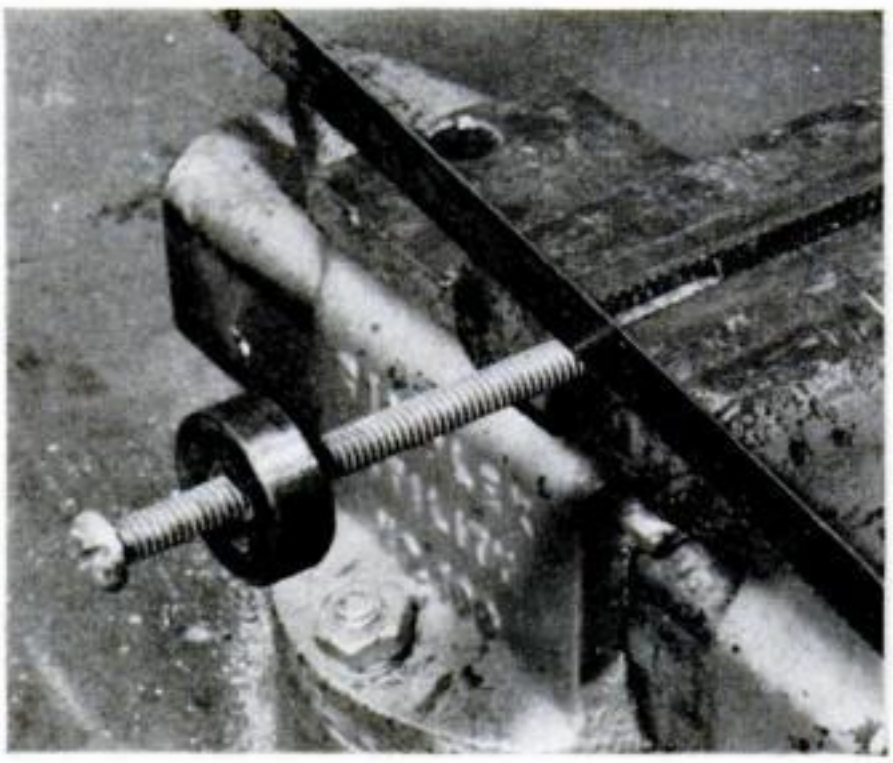
SHORT CUTS AND TIPS FROM PS READERS



Clamp for drilling thin metal stock

Here's how to keep thin sheet-metal stock from climbing up the drill bit and whirling around to slash your fingers. Support the metal strips in this modified screw clamp. To make it, you just mill or file a step about ⅛" square along the edges of each jaw of an inexpensive, unhardened parallel metal clamp. Secure the metal strips in the grove, and hold the clamp while you're drilling.

F. MURRAY, Chicago.



Die and file help in cutting a bolt

Have you ever had trouble threading a nut back onto a bolt you shortened by hacksawing? Few can answer no. Next time you shorten a bolt, run a die onto it first. Run it past the point where you'll cut. Saw. Then flatten the sawed end and round off the edges with a file. Back the die off. It straightens damaged threads and leaves the end ready to take the nut first try.

WILL THOMAS, Buffalo, N.Y.

Urheberrechtlich geschütztes Material

Announcing World-Famous NATIONAL RADIO INSTITUTE'S

Completely New Training-at-Home

for the man who wants to SAVE MONEY and MAKE MONEY
— spare time or full time — cashing in on the demand for men who know how to

SERVICE ELECTRIC APPLIANCES

NRI's 50th Anniversary Brings You This Opportunity of a Lifetime To Become a Master Appliance Technician . . . Save on YOUR OWN Home, Shop or Farm Repairs . . . Make $3 to $5 an Hour Fixing and Servicing Appliances for Your Neighbors!

FOR 50 years, NRI has been successfully training men like you to become top-notch Technicians. Now NRI training is bigger and better than ever – YOU gain bigger and better profits from it!

NRI's *new*, completely revised and *expanded* home-training course offers you EVERYTHING YOU NEED TO KNOW—whether you want to fix your own appliances to *save* money, or *make* money.

Easier Than You Think!

You DON'T need technical experience. You DON'T need higher education. Everything is *explained* in plain English – *shown* in big, detailed, clear pictures. You start from scratch – learn how electricity works – then rapidly advance to installing new outlets, rewiring, fixing and servicing every kind of home, farm and business appliance.

NRI's special new section on modern air conditioning and refrigeration gives you complete know-how in this fast-growing field. Other sections are invaluable for men who work on farms, or in stores or plants. No matter what you're called on to fix, in no time you'll be making repairs like a pro. And – you now get special bonus lessons on 2- and 4-cycle gasoline engines!

Make Extra Money

More than a MILLION appliances and engine-powered tools are sold *each week!* Once you can fix them, you'll "cash in" on this boom. It's a fact: NRI-trained men earn $3.00 to $5.00 an hour *in spare time alone!*

Don't worry how little you may *now* know about repair work. Former student John D. Pettis, who works out of his basement, says: "I had practically no knowledge of any kind of repair work. Now I am busy almost all my spare time and my day off – and have more and more repair work coming in all along."

No matter where you live, everyone owns and *depends on* appliances. And once you know how to service them, the owners depend on YOU!

MAIL COUPON TODAY

Wouldn't you like *right now* to be able to repair your own broken appliances? Wouldn't you like *right now* to have money coming in each week? Let NRI show you how. Free Book and Free Sample Lesson describe the new, expanded, low-cost NRI Course in full . . . show how you can quickly master repairing appliances in your spare time. Mail coupon TODAY (or write direct to): *National Radio Institute, Dept.601-095, Washington, D.C. 20016.* (No obligation, of course – and no salesman will call on you.)

This FREE BOOK

will open your eyes to a whole world of new opportunities for making money, saving money, through time-tested, low-cost NRI training

This FREE LESSON

will show how simple and clearly illustrated NRI training is – how it can quickly prepare you to be an *expert* Service Technician in your community!

Earn While You Learn with this Professional APPLIANCE TESTER KIT – *Yours at No Extra Charge!*

FIX ALL THESE — AND MORE!

- Travel Irons
- Steam Irons
- Lighting Fixtures
- Fluorescent Lights
- Switches
- Heaters
- Fuses
- Plugs
- Lamps
- Electric Blankets
- Toasters
- Coffeemakers
- Chafing Dishes
- Automotive Air Conditioners
- Water Heaters
- Centrifugal Pumps
- Egg Cookers
- Bottle Warmers
- Vaporizers
- Paint Sprayers
- Waffle Irons
- Roasters
- Deep Fryers
- Electric Shavers
- Clocks
- Food Mixers and Blenders
- Tank Vacuum Cleaners
- Canister Vacuum Cleaners
- Upright Vacuum Cleaners
- AC Motors
- Non-automatic Washers
- Automatic Washers
- Refrigerators
- Freezers
- Vegetable Coolers
- Soda Fountain Coolers
- Bench Grinders
- Two-cycle Gasoline Engines
- Four-cycle Gasoline Engines

MAIL NOW FOR FREE BOOK AND SAMPLE LESSON

Mr. J. M. Smith, President
NATIONAL RADIO INSTITUTE
Appliance Servicing Division
Dept. 601-125, Washington, D.C. 20016

Please send Free Book and Free Sample Lesson. I am particularly interested in:

☐ Business of my Own ☐ Spare-Time Earnings
☐ Repairing My Own Appliances

No salesman will call

Name.....
(Please Print)

Address.....

City.....Zone....State.....

Accredited Member National Home Study Council

Urheberrechtlich geschütztes Material

Earn Extra $$$ RIGHT AWAY

You Can Be a SKILLED LOCKSMITH

LEARN AT HOME

Here is one field where mature men can earn better pay—have unlimited job opportunities. No need to wonder how you'll make ends meet if laid off, replaced by a machine, disabled, forced to retire! Locksmithing skill lets you say goodbye to such worries—CASH IN FAST in a big opportunity job or your own high-profit business spare-time, or full-time.

All Locks, Keys, Tools, Materials, & Equipment Supplied.

Age, education, minor physical handicaps don't matter in this booming profession. As little as one hour a week doing real jobs on all kinds of locks and keys under expert guidance brings quick mastery—and ends job and income worries forever.

FREE Book, Sample Lesson Pages.

Send for FREE illustrated book and sample lesson pages today. No salesman will call. Only school of its kind; Licensed by N.J. State Board of Education; Accredited Member, National Home Study Council; VA Approved.

LOCKSMITHING INSTITUTE
Division of Technical Home Study Schools
Dept. 111-125, Little Falls, N. J. 07424

FINDS 3-WAY INCOME INSURANCE

"I earned $2,901.77 while learning locksmithing and now make $5,000 a year—doubling my income. Worries about layoffs, retirement, more money are over for me — thanks to the Locksmithing Institute Course!" — Stanley Nowak, Saginaw, Mich.

306 Pieces of equipment LOCKS, PICKS and TOOLS supplied for use with course.

SEND FOR FREE BOOK

LOCKSMITHING INSTITUTE, DEPT. 111-125
Little Falls, New Jersey 07424 *Est. 1948*

Please send FREE Illustrated Book—"Your Big Opportunities in Locksmithing," complete Equipment folder and sample lesson pages—FREE of all obligation —(no salesman will call).

Name .....
(Please Print)

Address .....

City ..... State ..... Zip .....

You can make money in

WATCH REPAIR

Learn at home the low cost Sweazey Way

Watch repairing pays up to $6 an hour, part time watch makers report on survey. Unique and modern Sweazey home study System starts you making repairs right away on Swiss and American watches. Professionally prepared training. No previous experience needed. Special tools provided for practice. Tuition only $5 a month. Diploma Awarded. Free sample lesson and opportunity book give all facts. Write today. No obligation.

CHICAGO SCHOOL OF WATCHMAKING
Dept. 4125 Fox River Grove, Illinois 60021

NOW-You Can Fix Cars Faster

With MOTOR's 2-in-1 Auto Repair Manual!

FIX just about any part of 2,341 models. 1958 through 1965. NEW edition. Trouble-shooter spots what's wrong—Manual pages show exactly how to fix it! 1,325 big pages. 3,800 pictures. MUCH MORE! FREE 10-DAY TRIAL. Then pay $2 in 10 days, $3 a month for 2 months, then $1.95 (plus delivery charge and sales tax), or return book. Send no money now! MOTOR BOOK Dept., Desk 52Y, 250 West 55th St., New York, N.Y. 10019

NOW! YOU CAN ANALYZE HANDWRITING SCIENTIFICALLY

Now you can "read-between-the-lines" of personal letters, notes, signatures, etc. Understand hidden meanings . . . see true characters of the writers. Amazing new text by world-famed founder, International Graphoanalysis Society. Thoroughly illustrated step-by-step instructions bring you a sure way to REALLY know people.

FULL PRICE ONLY $2.98

COMPLETE SATISFACTION GUARANTEED! Helps you better understand yourself, your family, friends, neighbors, business contacts. Complete price **only $2.98** postpaid—or COD plus postage. Satisfaction guaranteed or your money back instantly. Order "Handwriting Analysis" today. **Nelson-Hall Co., 325 W. Jackson Blvd., Dept. MW-1, Chicago, Ill. 60606.**

A BUSINESS OF YOUR OWN

REPAIR HYDRAULIC JACKS

Earn while you learn at home. Trained and qualified mechanics needed NOW to service inoperative hydraulic jacks. BIG opportunity for ambitious men. We show you HOW — in your basement or garage, spare time cash income in an expanding industry. Don't wait, ACT NOW! Get the facts,

Write for folder No. PS-12 and free bonus o r

HYDRAULIC JACK REPAIR MANUAL CO.
P. O. BOX 50 • BLOOMFIELD, N. J.

LEARN IBM

AT LAST! With **THOUSANDS** of prestige positions waiting for new data processing technicians and **PAY** scales at a **RECORD HIGH**, A.T.C.'s exclusive methods are available to you in a **SPECIAL HOME STUDY PROGRAM GEARED TO YOUR TIME AND BUDGET.** No contracts to sign . . . you pay for each lesson only when you order it! Send for free logic test to see if you can qualify. **No Cost or Obligation of course.**

AUTOMATION TRAINING CORPORATION
7023 E. Kirby, Dept. PS-48, Detroit 11, Mich.

INVENTORS

PATENT SEARCHES IN U.S. PATENT OFFICE
Patent Development Engineering and Patent Sales Promotion
Send for Free Invention Certificate and Patent Information

GEORGE SPECTOR Licensed Patent Engineer
U.S. Patent Office Former Examiner, 3615 Woolworth Bldg., New York

REAL ESTATE

BE A BROKER

PAYS BIG! SEND FOR FREE, BIG, ILLUSTRATED CATALOG NOW! Graduates report making substantial incomes. Start and run your **own business quickly.** Men, Women, all ages, learn easily. Course covers Sales, Property Management, Appraising, Loans, Mortgages, & related subjects. **STUDY AT HOME** or in classrooms in leading cities. **DIPLOMA AWARDED. Write TODAY for FREE Booklet!** Accredited Member National Home Study Council. (Established 1936)

FREE BOOK TELLS HOW

WEAVER SCHOOL OF REAL ESTATE
3521-S Broadway Kansas City, Mo. 64111

Liquid WRENCH

LOOSENS RUSTED NUTS, BOLTS, PARTS IN SECONDS
at Service Stations, Auto and Hardware Stores

SAVE $80

AIR CONDITION YOUR OWN CAR

Easy! We supply everything you need, kit, tools, illustrated step-by-step instructions. Just 4 hours to install. Made by leading auto air conditioning manufacturer. 12 month, 12,000 mile warranty. Our price to you just $149 (you save at least $80). Send $1 for complete instructions, applicable against purchase price. Please state make and year of car.

COMFY-KIT 1707 E. Ohio Street, Dallas, Texas Dept. 412

Urheberrechtlich geschütztes Material

--Earn To $15 An Hour, Full or Spare Time--

INVESTIGATE ACCIDENTS

CAR FURNISHED **EXPENSES PAID**

NO prior experience needed. Only average education required.

YOU PERFORM A REAL SERVICE

WHILE ENJOYING A BIG-PAY CAREER

As an Accident Investigation specialist you will (1) INVESTIGATE FACTS and (2) DISTRIBUTE MONEY as the representative of wealthy organizations.

No other business offers you greater opportunities. Here's why: The huge, rapidly expanding Accident Investigation field right now distributes more money than any other service industry. And it's growing *fast*. Over 200 MILLION ACCIDENTS must be investigated this year for Insurance Companies, Airlines, Steamship Lines, and Government Offices.

KEEP PRESENT JOB UNTIL READY TO SWITCH

Already hundreds of men we have trained are earning thousands of dollars extra each month. Joe Miller earned $14,768 his first year. A. J. Allen earned over $2,000 in ten weeks. Robert Meier says "I'm now earning $7.50 to $15.00 an hour in my own business ... Universal's course is wonderful."

FREE EMPLOYMENT HELP GIVEN

Firms needing men from coast-to-coast, in Canada and overseas, call upon Universal. *We place far more men in this booming field than any other individual, company or school.* Write today. Let me show you how easy it is for you to get into this exciting new career in just a matter of weeks. No obligation. No salesman will call.

Mail Now for FREE BOOK

M. O. Wilson, Dept. PS-12
Universal Schools,
6801 Hillcrest, Dallas 5, Texas
Please rush me your FREE BOOK on Big Money In The Booming Accident Investigation Field. I will not be under the slightest obligation — and no salesman will call upon me.

Name .....

Address .....

City ..... Zone ..... State .....

75 POWER TELESCOPE 25X-45X-75X $3.98

NEW 3 in one telescopes, 3 variable 25X 45X-75X magnification. Brass bound. 25 power for ultra bright images 45 & 75 power for long range. Guaranteed to bring distant stars, moons, objects, sports 75 times closer.

Most powerful scope sold anywhere near this amazing low price. American made, 5 sections. Opens 36", closes 1 ft.; contains 4 ground & polished lenses. Can also be used as powerful compound microscope. Mass production enables us to offer telescope complete at $3.98 postpaid. Money back guarantee.

CRITERION CO., Dept PSB-33, 331 Church St., Hartford, Conn.

B.S. DEGREE IN 36 MONTHS

Small professionally-oriented college. Four-quarter year permits completion of degree in *Engineering* or *Business Administration* in three years. One year Drafting and Design Certificate program. Founded 1884. Rich heritage. Excellent faculty. Small classes. Well-equipped labs. New library. Residence halls. 300-acre campus. Graduate placement outstanding. *Modest costs.* Enter Jan., March, June, Sept.

For Catalog And View Book, write Director of Admissions

TRI-STATE COLLEGE

5125 College Avenue • Angola, Indiana

When Writing to Advertisers

Please Mention Popular Science

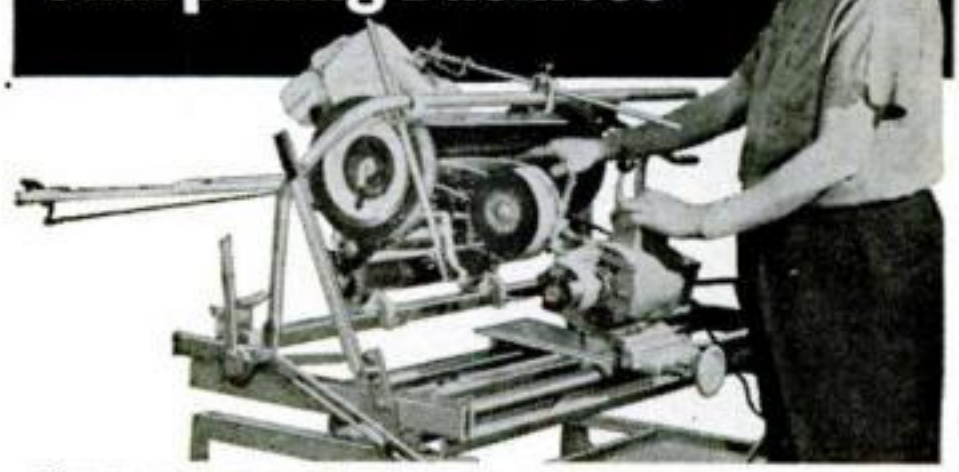
NO JOB WORRIES

PLASTEX INDUSTRY needs manufacturers on small scale for big production of Lamps, Clock Stands, Art Goods, Novelties in Plastic Marble imitation. No experience necessary. ½¢ material makes regular 10¢ store sellers. Moulds furnished for fast production. Small investment brings good profit. Big wholesale orders now being placed. Ambitious men have chance for real prosperity and job security. Our NEW FREE booklet will interest and benefit you.

PLASTEX INDUSTRIES, Dept 2, 3400 Third Ave. New York 56 N.Y.

Here's How You Can Have a

Profitable Lawn Mower Sharpening Business



EARN $5 AN HOUR!

Earn extra cash right from the start—average $5 an hour. The Foley Lawn Mower Sharpener is a complete shop in one machine. No experience is needed to start—anyone can operate it, and turn out professional-like jobs. All operations are done quickly, easily and accurately.

Operate in Sparetime, in Your Own Home

An ideal sparetime business—although many find it so profitable, they devote full time to it. For complete fact-filled booklet, send coupon. No salesman will call:

Foley Mfg. Co. 1208-5 Foley Bldg., Mpls., Minn. 55418
Send booklet on Lawn Mower Sharpening business.

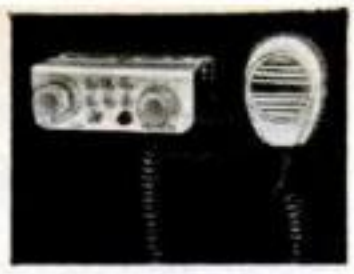
Name_____

Address_____

City_____ State_____ Zip Code_____

Urheberrechtlich geschütztes Material

SMALL PACKAGE BIG PUNCH!



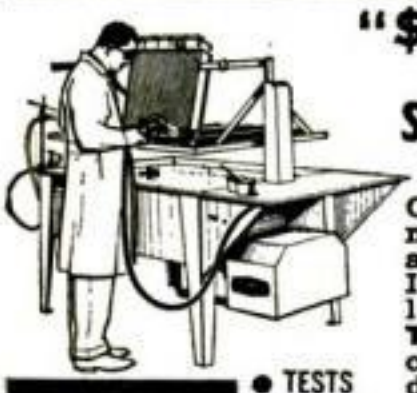
INTERNATIONAL
Model MO TRANSCEIVER
For CITIZENS RADIO SERVICE

The International Model MO Citizens Radio transceiver, custom designed for mobile installation, provides instant push-to-talk crystal controlled operation on any 6 channels with full 5 watts power input.
The new compact control head provides complete remote controlled operation. Solid-state crystal switching circuit. Operating channel is indicated by an illuminated button on control head. Tubes and silicon transistors combined to provide a trouble-free circuit.

See the International Model MO at your dealer.

INTERNATIONAL
CRYSTAL MFG. CO., INC.
18 NO. LEE • OKLA. CITY, OKLA. 73102

FCC Citizens Radio license required. All use must conform with Part 95, FCC Rules and Regulations.



"$705.83 LAST MONTH SERVICING RADIATORS"

—ROSS FLUMMERFELT
HUGOTON, KANSAS (Pop. 2,912)

Operate your own profitable business. Easy to test, clean, repair auto-truck-tractor radiators with Inland equipment. Inland, world's largest mfr. of radiator equip., **TRAINS YOU FREE.** Proved merchandising assures volume. Small down payment starts you... Pay-As-You-Profit plan.

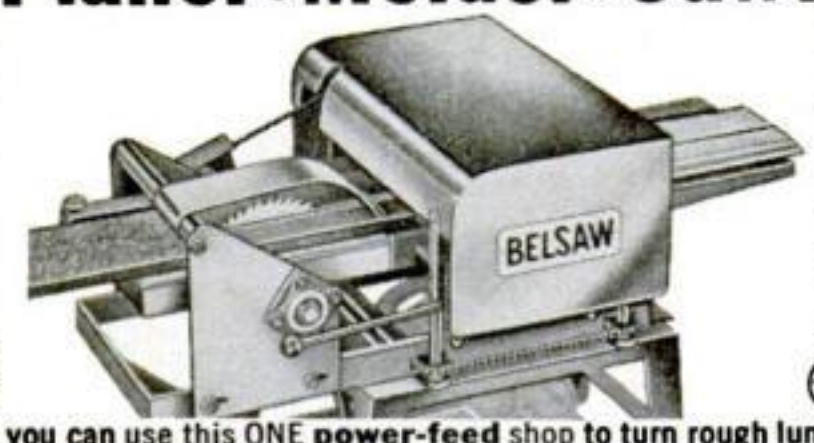
NEW INLAND BENCH With ELECTRAMATIC Drive & Brake

- TESTS
- REPAIRS

FREE! 32-page booklet "Blueprint for Profits" shows equip., prices, owner letters.

INLAND MFG. CO., Dept. PS-12
1108 Jackson, Omaha, Nebr. 68102
Send free 32-page booklet and money-making plan.
Print
Name_____
Address_____
City_____ State_____

Planer•Molder•Saw!



Now you can use this ONE **power-feed** shop to turn rough lumber into moldings, trim, flooring, furniture... ALL popular patterns. RIP... PLANE... MOLD... separately or all at once with a one HP motor. Use 3 to 5 HP for high speed output. Low Cost... You can own this power tool for only **$30.00** down payment.

Send postcard today for complete facts.

BELSAW POWER TOOLS, 926 Field Bldg., Kansas City 11, Missouri

Say YES to C.T.I.

Better Training, Bigger Paychecks are the reasons why!

- **Industrial Electronics • Color and B&W TV**
- **Air Conditioning, Refrigeration & Heating**
- **Auto Mechanics • Building Construction**

Circle course wanted. Send for FREE FACTS!
COMMERCIAL TRADES INSTITUTE, Dept. 1-N
1400 W. Greenleaf • Chicago, Ill. 60626
Accredited Member National Home Study Council

Statement of Ownership, Management and Circulation (Act of October 23, 1962; Section 4369, Title 39, United States Code)

1. Date of filing: October 1, 1965.
2. Title of publication: Popular Science Monthly.
3. Frequency of issue: Monthly.
4. Location of known office of publication: 355 Lexington Avenue, New York, New York 10017.
5. Location of the headquarters or general business offices of the publishers: 355 Lexington Avenue, New York, New York 10017.
6. Names and addresses of publisher, editor, and managing editor: Publisher: John R. Whiting, Popular Science Publishing Company, Inc., 355 Lexington Avenue, New York, New York 10017; Editor: Ernest V. Heyn, 355 Lexington Avenue, New York, New York 10017; Managing Editor: Kendall W. Goodwyn, 355 Lexington Avenue, New York, New York 10017.
7. Owner: The Stockholders owning more than 1% of Popular Science Publishing Company stock are: Noreen S. Capen, Capeswold, Bedford Village, New York; Marguerite N. Cole, Round Hill Road, Greenwich, Connecticut; Robert D. Cole, Round Hill Road, Greenwich, Connecticut; Helen B. Glennon, 49 Woodbine, Larchmont, New York; Godfrey Hammond, 1 Carstensen Road, Scarsdale, New York; Irma V. Hammond, 1 Carstensen Road, Scarsdale, New York; Margaret C. Jennings, 12 Overlook Drive, New Canaan, Connecticut; Atwell and Company, 45 Wall Street, New York, New York 10005; Jean L. Van Buren, Grosset Road, Riverside, Connecticut; Ada Bell Wilson, 683 Springfield Avenue, Summit, New Jersey.
8. Known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages or other securities: None.
9. Paragraphs 7 and 8 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner. Names and addresses of individuals who are stockholders of a corporation which itself is a stockholder or holder of bonds, mortgages or other securities of the publishing corporation have been included in paragraphs 7 and 8 when the interests of such individuals are equivalent to 1 percent or more of the total amount of the stock or securities of the publishing corporation.
10. This item must be completed for all publications except those which do not carry advertising other than the publisher's own and which are named in Sections 132.231, 132.232, and 132.233, Postal Manual. (Sections 4355a, 4355b, and 4356 of Title 39, United States Code) A. Total no. copies printed (net press run): Average no. copies each issue during preceding 12 months, 1,474,564; single issue nearest to filing date, 1,475,438. B. Paid circulation: 1. Sales through dealers and carriers, street vendors and counter sales: Average no. copies each issue during preceding 12 months, 336,500; single issue nearest to filing date, 328,000. 2. Mail subscriptions: Average no. copies each issue during preceding 12 months, 1,023,673; single issue nearest to filing date, 1,032,319. C. Total paid circulation: Average no. copies each issue during preceding 12 months, 1,360,173; single issue nearest to filing date, 1,360,319. D. Free distribution (including samples) by mail, carrier or other means: Average no. copies each issue during preceding 12 months, 23,201; single issue nearest to filing date, 17,246. E. Total distribution (Sum of C and D): Average no. copies each issue during preceding 12 months, 1,383,374; single issue nearest to filing date, 1,377,565. F. Office use, left-over, unaccounted, spoiled after printing: Average no. copies each issue during preceding 12 months, 91,190; single issue nearest to filing date, 97,873. G. Total (Sum of E & F—should equal net press run shown in A): Average no. copies each issue during preceding 12 months, 1,474,564; single issue nearest to filing date, 1,475,438. I certify that the statements made by me above are correct and complete.
(Signed) John R. Whiting, Publisher

Urheberrechtlich geschütztes Material

IF YOU HAVE RUPTURE

Get this *NEW FREE BOOK*

Tells how Rupture can be treated by a mild Non-Surgical method that is backed by a Life Time Certificate of Assurance. This treatment method has a long history of use and is recognized by Authorities today. Men and Women from all over the country have taken the Non-Surgical Treatment and reported it is effective. Why put up with wearing a griping, chafing, unsanitary truss?

Write today for this FREE BOOK. Tells How, explains Why more and more Rupture Sufferers are using Modern Non-Surgical Treatment Methods. Act Now. No Obligation.

EXCELSIOR MEDICAL CLINIC
Dept. E6231 **Excelsior Springs, Mo.**

MAKE UP TO $12.00 AN HOUR AT HOME

Let Me Prove It To You FREE!

I'll show you how Plastic Sealing and Laminating at home, spare time, can give you as much as $12.00 each hour you operate. Table-top machine sets up anywhere. Easy. Fun. No experience needed. We furnish everything. *We'll even help finance you.* No house-to-house selling. Orders come by mail. Write for facts FREE. No salesman will call.

Warner Electric, 1512 Jarvis, Dept. L-3-PW Chicago, Ill. 60626

TELLS HOW TO SELL YOUR INVENTION

If you have an invention that you believe has merit, write us at once for copy of copyrighted booklet "How to Go About Selling Your Invention." We work with manufacturers, and booklet reveals present markets, qualities of a saleable invention, current royalty rates being paid by manufacturers. Booklet is FREE, is offered to encourage new ideas we might submit to manufacturers. Just send name (no drawings, please) to **Kessler Sales Corporation, Dept. D-712, Fremont, Ohio 43420**

THERMOREX FOUNDRY

HOBBYISTS - ARTISTS - MECHANICS - INVENTORS

It's now practical to make metal castings of bronze, aluminum, copper, gold, white metal, silver and other metals with similar melting points - capacity 3 to 53 lbs. - 2400 degrees F. Thermorex furnace has no peer for economy, efficiency and ease of operation. Send for free brochure.

PYRAMID PRODUCTS COMPANY
P. O. BOX 65 - FAYETTEVILLE, ARKANSAS

WHEN ANSWERING ADS—GIVE YOUR ZIP CODE

GUARANTEED FASTEST WAY to he-man strength! Famous DAN LURIE BARBELLS

SEND FOR FREE GIANT CATALOG

Factory Prices	Cast Iron	Semi-Steel
50 lb. Set..	$9.48..	$10.48
100 lb. Set..	15.98..	18.98
150 lb. Set..	23.48..	27.48
Extra Wts..	16c lb..	18c lb.

$9.48 Plus Free $10 Course

MONEY BACK GUARANTEE—Send 50% in check or money order F.O.B. Plant Brooklyn, New York. Balance C.O.D.

DAN LURIE BARBELL CO., 1661 5-12 Utica Ave., Dept. 570M, Brooklyn 34, N.Y.

BE WARM WHILE YOU WORK WITH jon-e WARMERS

Gives Heat Without Flame

Work outside? Forget the cold! Just put one or two Jon-E Warmers to work. Slip these flameless "personal radiators" into your pockets and stay warm and comfortable all day regardless of freezing weather. A Jon-E can keep you warm all day on only one filling of Jon-E Fluid.

Insist on the genuine Jon-E. Never wears out. American-made. Fully guaranteed.
Standard size—$3.95 Giant size—$4.95
Lights cigarettes, too!
Jon-E Fluid lights fast, longer lasting.
8 oz. can—49¢ 16 oz. can—79¢

ALADDIN LABORATORIES, INC.
620 So. 8th St., Minneapolis, Minn.

---

when it's time to think of college you should read this

FREE CAREER BOOKLET

about engineering at

MSOE

MILWAUKEE MS-236
SCHOOL OF ENGINEERING
Dept. PSM-1265, 1025 N. Milwaukee Street
Milwaukee, Wisconsin 53201

Tell me about an engineering career through residence study in:

☐ **Electrical fields** ☐ **Mechanical fields**

Name.....Age.....

Address.....

City, State.....

Urheberrechtlich geschütztes Material

MAKE $30 TO $100 A DAY

Some make more, some less

MAKE BIG MONEY • With an easily operated, highly efficient WALL WASHER, H.D. Hart makes $30 to $100 every day he works. E. Goss took in more than $10,000 in one year. C.H. Jones wrote, "I made a net profit of $1200 on one job." And no wonder — this machine washes walls 6 times faster and better than by hand and with no mess — no drop cloths needed.

Your Money-Making Opportunity • We want more men to go into this profitable business for themselves and enjoy independence — freedom from layoffs and bosses. Customers everywhere — homes, offices, schools, churches, hotels, etc. How much you earn depends largely on you, but we help you to start and work with you for your success. Training and consulting with experts is available at no additional cost. What you take in is mostly profit. No need to rent shop or office; operate from home. Can start spare-time until full time is justified.

We help you to start your own all-year business

Ours is NOT a lease arrangement • You are free to operate in an independent manner. You sign no contract. You own the deterger outright and are always your own boss...and every dollar you take in is yours to keep. You pay no fees, or dues, or royalties to anyone, and enough supplies come with it to return far more than your investment. Many earn the cost of the deterger in a week or two. It costs nothing to get details... write TODAY.

Lose No Time – Send Coupon Today for All the Facts

FREE BOOK! MAIL COUPON TODAY

VON SCHRADER MFG. CO.
W11 "W" Pl., Racine, Wisconsin

Send at once (no obligation) your **FREE** booklet containing information about your WALL WASHING MACHINE and how I can start *my own* permanent, profitable business.

Name_____

Address_____

City_____ State_____ Zip Code_____

TRIM THAT WAISTLINE—NEW! NEW! Great new heat belt! Fits snugly around waist to create heat with the slightest exertion. Ruggedly built to give with any type of movement without slipping down or up. Wear it to work or a workout! Send waist size. $2.95. **House of Health, Dept. P-2, 310 East 1st St., Dayton, Ohio 45402**

CAST A TOY ARMY

POUR and **PAINT** lead soldiers 2¼" tall in 3 action poses . . . up to 100 per hour . . . for **FUN & PROFIT!**

JUST LIKE DAD DID, ONLY BETTER! EXCITING KIT
includes 3-soldier mold, clamp, handles. Electric stove, ladle. Paints, brush, 18 pigs of casting metal. A world of fun. **Only $10.00 postpaid.**
Add $2. W. of Rockies, Canada, Mexico.

EXTRA LEAD MOLDS $3.50 EA.

MOLD A CANNON WITH WHEELS THAT ROLL . . . 3 Knights of the Round Table—Indians, etc. Add 50c postage per set of molds.

HOME FOUNDRY Dept. PSI 1830 S. Washtenaw Chicago, Illinois 60608

What's happened to guns since World War II?

READ

"THE BIG CHANGE IN GUNS"

by Jack O'Connor, world famous hunter and writer.

This **special 16-page bonus** is *exclusive* in DECEMBER OUTDOOR LIFE MAGAZINE

Pick up a copy at your newsdealer today.

ONLY 35¢

Urheberrechtlich geschütztes Material

U.S. GOV'T SURPLUS

DIRECT FROM GOV'T. FOR ONLY A FRACTION OF ORIGINAL COST. BUY FOR AS LITTLE AS 2¢ AND 3¢ ON THE DOLLAR!!

Examples:

JEEPS $63.00
BOATS $178.00
BICYCLES $5.50
TELESCOPES $4.00
LEATHER BOOTS 65¢
TYPEWRITERS $8.79
AIRPLANES $159.00
REFRIGERATORS $5.00
PASS. BUSSES $208.00

COMPLETE SOURCES AND INFORMATION ON HOW YOU CAN BUY THOUSANDS OF ITEMS FROM GOV'T—ONLY $1.00

FREE!! FREE!! EXTRA 48 PAGE SECTION WITH PICTURES AND PRICES OF MORE THAN 500 ITEMS. YOU CAN ORDER DIRECT BY MAIL AT RIDICULOUSLY LOW SURPLUS PRICES. YOURS FREE WHEN YOU SEND $1.00 FOR THE DIRECTORY.
THIS IS THE WORLD'S LARGEST STOCK!!

RIFLES 10.95
PARACHUTES 21.95
BOATS 16.45
SHOES 1.65
JACKETS 3.25
TENTS 6.55
BAYONETS 2.15
HAND GRENADES 1.60
COMMANDO KNIVES 1.38
COMPASSES 1.05
HOLSTERS 2.15
MACHETTES 2.15
GOGGLES 61c
PISTOL BELTS 1.05
STEEL HELMETS 2.15
GIANT BALLOONS 1.38
MODEL CANNONS 1.38
BAYONETS 1.65
CARTRIDGE BELTS 1.05
STEEL AXES 2.70
CANTEENS 67c
FOLDING STOVE 1.38
FIELD PACK 1.05
MIRRORS 61c
FIELD JACKETS 3.25
AND Bunk Beds,
Life Rafts, Walkie Talkies, Swords, Paratrooper Boots, Flags, Sleeping Bags, Cots, Phones, Mine Detectors, Bugles, Hand & Leg Irons, Blankets, Bullet Proof Vests, Flares, Cartridge Belts, Ammo, Rifle Scopes, Maps, Shovels, Canteens, Saddles, First Aid Supplies, Sunglasses, Mess Kits, Haversacks. AND HUNDREDS MORE

BUY ONE, TWO OR A DOZEN OF ANY ITEM YOU WANT.
MINIMUM ORDERS AS LOW AS $5.00 ACCEPTABLE

FREE HOME TRIAL COUPON

SURPLUS BARGAINS, DEPT. 135-12
605 THIRD AVENUE
NEW YORK 16, N. Y.

I enclose $1.00. Send the combined catalog and directory immediately. I understand that my money will be refunded if I am not completely satisfied. Also I will receive a full refund with my first order of $10.00 or more.

Name _____
(Please Print)
Address _____
City _____ State _____

FULL PURCHASE PRICE OF $1.00 REFUNDED WITH FIRST ORDER OF $10.00 OR MORE

LAW FREE BOOK

THE LAW TRAINED MAN

Write today for a FREE copy of illustrated law book. **"THE LAW-TRAINED MAN."** which shows how to earn the professional Bachelor of Laws (LL.B.) degree through home study of the famous Blackstone Law Course. All necessary books and lessons provided. Moderate cost: convenient monthly terms. Write for FREE law training book today.

Blackstone School of Law, 307 N. Michigan Ave
Founded 1890 **Dept. 129, Chicago 1, Illinois**

GET INTO ELECTRONICS

V.T.I. training leads to success as technicians, field engineers, specialists in communications, guided missiles, computers, radar, automation. Basic & advanced courses. Electronic Engineering Technology and Electronic Technology curricula both available. Assoc. degree in 29 mos. B.S. obtainable. G.I. approved. Start Feb. Sept. Dorms, campus. H.S. grad. or equivalent. Catalog.

VALPARAISO TECHNICAL INSTITUTE
DEPARTMENT S, VALPARAISO, INDIANA

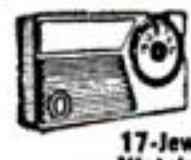
BE A MAGICIAN!

EASIER THAN YOU THINK!

Get started today! Become a popular man of mystery. Earn and learn in spare time. Magic is fun and profitable too. Be the Life of the Party. Astonish your friends!

RUSH **10¢** now for
PROFESSIONAL MAGIC CATALOG
160 pages thick • 800 Illus. • 1000 Mysteries
Also Jokes, Puzzles, Secrets, Illusions.

VICK LAWSTON'S MAGIC DEN
4018 N.E. 5th Ave. (Dept. PS125), Ft. Lauderdale, Fla.


Transistor Radio with Battery $1.96

17-Jewel Watch $2.87

Derringer Pistol $5.74

HOME-IMPORT BUSINESS—Make Big Profits

New Drop Ship Plan offers you first day profits! Deal direct with overseas sources at prices shown. Dazzling bargains with no investment. Full or spare time. Write for FREE BOOK today to . . .
MELLINGER, 1554S. Sepulveda, Dept. P24C, Los Angeles 25

Buy & Hold U.S. Savings Bonds

---

5 Day Home Trial

WORLD'S LARGEST DEALER

"NEW SOUND" ACCORDIONS-SAVE ½*

42 NEW ELECTRONIC/STANDARD MODELS
***SAVE 1/2** off retail prices of comparable accordions! 42 exciting new models—Standard, ELECTRONIC, Amplifiers, too! All famous makes. Try before you buy. Free Accessories. E-Z Terms. Trade-ins. Lifetime Performance Policy. Money back guarantee. FREE Color Catalogs and Importer-to-You Discount Prices. Rush coupon.

ACCORDION CORP. of AMERICA, Dept. P125
5535 W. Belmont, Chicago 41, Illinois

Accordion Corporation of America, Dept. P125
5535 W. Belmont, Chicago 41, Ill.
Send FREE Catalog of Accordions, Amplifiers—Discount Price List.

FREE New Color Catalogs—Discount Prices

Name _____
Address _____
City _____ State _____
☐ Check here if you have Trade-in

Urheberrechtlich geschütztes Material

You'll have it MADE in jig-time with these 4 new

POPULAR SCIENCE SKILL BOOKS

A lifetime library of do-it-yourself skills in handy hard-paper volumes. Hundreds of show-how photos, drawings, plans.

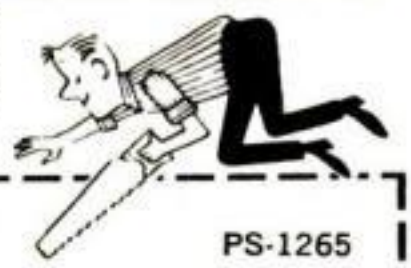
Published especially for Popular Science readers
ONLY $1.50 EACH

How To Build Your CABIN or MODERN HOME, by Harry Walton. Pole cabin with carport . . . California cabin and sundeck . . . 2-level vacation home – take your pick of the low-cost designs described in this amazing how-to guide. Twenty-two big, illustrated chapters give you start-to-finish instructions on how to turn that dream home into reality. How to select the site; how to choose plans and materials; how to lay foundations, erect frame structures; how to work with interior and exterior paneling, siding; how to construct porches, fireplaces, chimneys; right through water supply, waste disposal, power and heating. It'll be ready to move into before you know it.

How To Use HAND and POWER TOOLS, by George Daniels
Twenty-two chapters of this amazing book cover all tools from try-square to latest do-everything power models – how to choose the right tools for every job and budget, how to use them to get the most out of them, and how to keep them in top working condition. In addition to tremendous tool-by-tool coverage, get a host of extras: shop safety practices, project debugging, chapters on glues, clamps and abrasives. Also the fascinating story of ancient and prehistoric tools. PLUS hundreds of ingenious time- and money-saving ideas!

How To Be Your Own HOME ELECTRICIAN, by George Daniels
Thinking of replacing those old lighting fixtures? . . . putting in new surface wiring? . . . installing a complete electrical service system? Here's the book to have on hand. Tools, codes, wire types, wiring and splicing techniques, outlets, plugs, heavy loads, fluorescent lights, doorbells, chimes, outdoor lighting, standard and special switches and combination lighting controls. Step-by-step instructions and hundreds of photos and drawings show you how to handle every type of home electrical job *easily* and *expertly*.

How To Build Your Own FURNITURE, by R. J. DeCristoforo
Now you can make furniture you'll be proud of – even if you never tried your hand at it before! The ingenious new DeCristoforo Component System makes it easy, shows how to make perfect pieces – of every style and design. Drawers, doors, cabinets, dividers, shelves, tables, desks, chairs, bed frames – you learn to make them all, even create exciting new designs of your own – from simple combinations of *slabs*, *rails*, and *legs!* How to select and work with all woods, plywoods, composition boards, ready-made components, brackets, fasteners, hardware, everything you need to turn out a top job every time!



MONEY-BACK GUARANTEE!

Use this coupon to order any one or all four books. Complete satisfaction guaranteed or your money refunded in full.

POPULAR SCIENCE BOOKS
355 Lexington Avenue, New York, N. Y. 10017 PS-1265

Please send me postpaid:

- ☐ copies of How To Be Your Own HOME ELECTRICIAN, by George Daniels, at $1.50 each.
- ☐ copies of How To Use HAND and POWER TOOLS, by George Daniels at $1.50 each.
- ☐ copies of How To Build Your Own FURNITURE, by R. J. DeCristoforo at $1.50 each.
- ☐ copies of How To Build Your Own CABIN or MODERN VACATION HOME, by Harry Walton at $1.50 each.

I enclose $_____ in full payment.

Name_____

Address_____

City_____ State_____ Zip_____

Guarantee: If I'm not completely satisfied with any book, I may return it within 10 days and get a full refund.

Urheberrechtlich geschütztes Material

World's Only PRE-SMOKED PIPES!

Dr. Grabow

WORLD'S FINEST IMPORTED BRIAR

Starfire . . . . $4.95 Commodore $7.95
Viscount . . . $5.95 Eldorado . . $10.00

NEED NO BREAKING-IN

Your favorite blend never had it so smooth, right from the very first puff because: the world's only pre-smoked pipe needs no breaking-in! What curing does for tobacco, pre-smoking does for your Dr. Grabow.

For FREE Information Booklet, Write Dept. PS, **DR. GRABOW Pre-Smoked Pipes, Greensboro, N.C.**

PROFIT IN YOUR SPARE TIME

SMALL ENGINE REPAIR PAYS BIG!
Outboard · Powermower · Chain Saw · Tractor

MAKE EXTRA MONEY — or fix your own engines and SAVE! Illustrated, easy-to-learn Home Study Course qualifies you as expert. Free information. Write today!

LINCOLN TECHNICAL INSTITUTE
Suite 12-G, 472 Market Street, Newark 5, N.J.

Learn how to become a
GAME WARDEN
GOV'T HUNTER, FORESTER, WILDLIFE MANAGER

Exciting job openings now for qualified men who love outdoor work. *Protect forests and wildlife—arrest violators!* Good pay, security, prestige and authority for respected career Conservation Officers. *Easy home-study plan!* Send for FREE Fact BOOK, aptitude QUIZ, SUBSCRIPTION to Conservation magazine. State age.

NORTH AMERICAN SCHOOL OF CONSERVATION
Campus Drive, Dept 18C, Newport Calif. 92660

I-N-V-E-N-T-O-R-S
WE NEED INVENTIONS

Sell your invention for cash—need money for patent?—Are technical problems holding you back? Universal inventions has helped inventors all over the world—just like yourself—why not you? Inventions provide the magic spring-board to sudden riches. REMEMBER, we either sell your invention or pay you a cash bonus. Write for details

UNIVERSAL INVENTIONS, Dept. 12, Marion, Ohio

RUPTURED?
TEST THIS TRUSS FREE FOR 30 DAYS

Wear a Web for strong support and lasting relief of reducible inguinal rupture. If not satisfied after 30-day trial, purchase price refunded in full. Write now for free book on rupture care.

WEB TRUSS Co., Dept. PS-12, Hagerstown, Md.

When Writing to Advertisers Please Mention Popular Science

LEARN MEAT CUTTING

Train quickly in 8 short weeks at Toledo for a bright future with security in the vital meat business. Big pay, full time jobs—HAVE A PROFITABLE MARKET OF YOUR OWN! Pay after graduation. Diploma given. Job help. Thousands of successful graduates. Our 42nd year! Send NOW for FREE catalog. No obligation. G. I. Approved.
NATIONAL SCHOOL OF MEATCUTTING, Dept. 51-B, Toledo 4, O.

---

20 COURSE HOME STUDY PROGRAM

KARATE! JUDO

BOXING! MUSCLEBUILDING! YOGA! STRONGMAN STUNTS! STRENGTH & ENDURANCE! HANDBALANCING! ETC.

YOU GET **ALL** THESE! ●20 Illustrated KARATE blows ●SAVATE foot fighting ●Secret NERVE CENTER and ANATOMY charts ●20 lethal JUDO throws ●20 terrific STRONGMAN STUNTS ●Complete MUSCLE-BUILDING program ●Ancient YOGA secrets ●HANDBALANCING stunts ●Complete BOXING program ●Secrets of ENDURANCE ●TENSION-FLEX COURSE ●FITNESS EXERCISES ●KEEP FIT PROGRAM ●K MAN DUMMY. No C.O.D.'s. Canadians 75c. You Get The LOT...

FOR ONLY 50¢

FREE K-MAN KARATE PRACTICE DUMMY

HOME GYM & EQUIPMENT PLANS
Build gym equipment: Vault Horse, Rowing Machine, Boxing Ring etc. Convert basement, garage to gym. ONLY 50c with courses. TOTAL $1.00.

OXFORD STUDIO, 146 Blake St. (PS6) Mattapan, Mass.

NAME (print) .....
Address .....
City .....State.....

50c PROGRAM
$1.00 with Gym

SECRETS OF TEACHING YOURSELF MUSIC

This Money-Saving Way

YES! Teach yourself Piano, Guitar, ANY instrument—even if you don't know a note now! Famous proven Course makes it easy as A-B-C. Play actual pieces right away. FREE BOOK. **U.S. SCHOOL OF MUSIC, Studio A1512, Port Washington, New York 11050**
(Est. 1898. Lic. N. Y. State Educ. Dept.) Tear out ad!

ENGINEERING

HEALD TRAINED ENGINEERS are holding High Paying Positions in Industry, State and Federal Government.

AMERICAN INDUSTRY NEEDS TRAINED ENGINEERS NOW

BACHELOR OF SCIENCE DEGREE, 30 MONTHS

SAVE 2 YEARS' TIME

B.S. Degree Courses:
- ☐ Electrical Engineering
- ☐ Electronic Engineering
- ☐ Mechanical Engineering
- ☐ Civil Engineering
- ☐ Architecture

Diploma Courses:
- ☐ Radio-Television Plus Color Technician
- ☐ Electronic Technician
- ☐ Architectural Drafting
- ☐ Mechanical Drafting
- ☐ Structural Drafting

New Term Starts Quarterly

Write Today for Free Information.

HEALD'S ENGINEERING COLLEGE

Van Ness at Post, Dept. PS-1265 San Francisco, California

NAME _____
STREET _____
CITY _____ STATE _____

Urheberrechtlich geschütztes Material

Detroit Report...

GOODYEAR WILL MAKE RADIAL-PLY TIRES for the Toronado. Radial-ply tires have their "body" cords crosswise of the tire instead of at an angle. Oldsmobile's front-drive car will probably become the first to list these tires as a factory option. The expected advantages are extra handling precision and longer life. Goodyear has many years of experience with radial-ply truck tires.

Who will be first with radial-ply tires on rear-drive cars? Ford intended to make them optional on the Fairlane and the Mustang for 1966, but the decision was reversed almost on the eve of new-car introduction. Much work is being done to rework spring-anchorage points and locating-arm bushings in an effort to reduce the low-speed harshness that now exists with radial-ply tires when used on conventional cars. The spring of '66 will probably see radial-ply options for several Ford models, plus Corvair and Tempest.

Look for an optional V-8 in the Rambler American. Experimental cars with both 287-cu.-in. and 327-cu.-in. V-8s have been undergoing tests on public roads all over Wisconsin since last April. This program will soon be concluded, and a V-8 Rogue can be expected next January.

An even hotter Fairlane will bow as a 1966½ because Don Frey, General Manager of Ford Division, took one look at the "street" hemi-head Dodge engine and decided to find a way to mate Ford's 427 "high-riser" engine to the Fairlane. Tests of the combination are close to completion.

The body for the full-size fastback Dodge, which we identified as the Charger last month, isn't really the Charger, we've learned. The Charger is a fastback Coronet, and the wheelbase stays at 117 inches. But now we have a new mystery Dodge to talk about.

Oldsmobile can build 75,000 Toronados next year, says Harold Metzel, Olds General Manager. The Toronado is built on a separate assembly line, and even 75,000 is not the maximum figure. But it's a high number for a car that sells at $4,617 and up. Chief Engineer John Beltz says that nobody yet knows the true top speed of the Toronado. But the test drivers who are at the wheel at dawn complain that the retractable headlights won't shut until they've slowed down to about 120 m.p.h.

How did the GTO get its name? It started when Ferrari entered one GT (Grand Touring) car in a race back in 1962 and added the letter O some space along to signify "omologato." (To race against other GT cars, it must be homologated—approved—by the International Sporting Commission.) The race organizers entered the Ferrari as a GT-O in the race program, and the car became known as the GTO—but it was never a factory designation at Ferrari. Pontiac, who were already building the Grand Prix, liked the sound of the three letters and used them for the Tempest with the 389-cu-in. V-8 introduced in 1964.

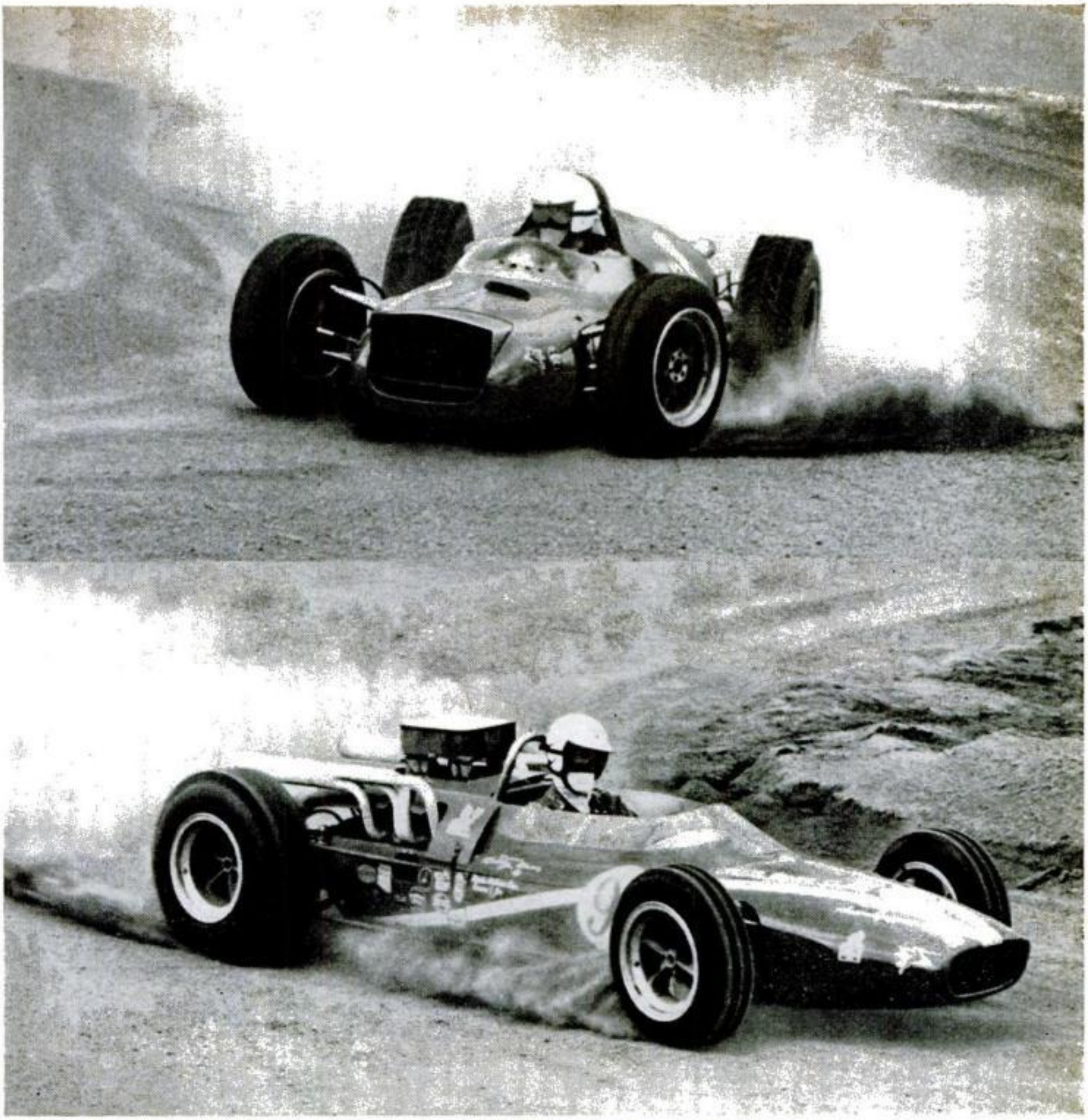
Airfreighting auto parts cost Ford Motor Co. $14.2 million last year. Most of this was used to fly parts supplies to farflung assembly plants to avoid shutdowns during shortages. According to Ford sources, airfreighting parts is a more economical way of dealing with day-to-day emergencies than the old method of sidelining cars with missing or wrong parts.

Few of the 700,000-odd Mustang owners in this country are aware of the fact that the car is used as a racer in Europe. It has won two major championships over there already and is gunning for others. The Mustang placed one-two in an 82-hour endurance race at Nurburgring, Germany, and it topped the field in a British championship event. The Mustang is entered in endurance events, rallies, and hill climbs.

Antique-car buffs who have a hard time replacing the glass in their vehicles can look to General Electric for a solution. It's no trick to get the glass cut to size, but finding a rubber gasket to hold it is another matter. GE has the answer —a liquid silicone it calls Auto Seal. It goes on like toothpaste and air-cures.

Jan P Norbye
Automotive Editor

Urheberrechtlich geschütztes Material



Al Unser takes first... Bobby Unser second in Championship Class using silvery-plated Champions

Ford and Chevy-powered cars equipped with Champion spark plugs finish one, two at Pike's Peak Climb! The overwhelming majority of engine experts choose Champions because Champions have no equal for performance – regardless of make of engine. Why settle for less in your car?

To feel new power, instantly, install new Champions now and every 10,000 miles

DEPENDABLE CHAMPION SPARK PLUGS

Urheberrechtlich geschütztes Material

. . . and years of future security in the multi-billion dollar construction industry, in this country and *overseas!* Learn how at National, the original school of heavy equipment operation. For men ages 17 to 56. National is NOT a correspondence school. You train on school-owned diesel-engined machines at National's huge proving ground in North Carolina. Full 220 and 440 hour courses. Full-time Job Advisory and Counselling Director for the exclusive benefit of graduates. VA approved. Payment plans available. Write TODAY for FREE catalog. National School is a member of the American Road Builders Association, Service and Supply Division.

Since National School was founded ten years ago, students from all 50 states and 28 foreign countries have been enrolled. Hundreds of graduates are now working in construction for higher wages than they ever made before.

NATIONAL SCHOOL
OF HEAVY EQUIPMENT OPERATION Dept. A-68
P. O. Drawer 1686, Charlotte, N. C.

Please send me FREE illustrated school catalog and complete information. I understand there's no obligation.

Name.....**Age**.....

Address.....**Phone**.....

City.....**Zone**.....**State**.....

FREE Key Machine

Kind master locksmiths use. Sells for $125, but yours FREE with Locksmithing Course

You Can Learn To Be A LOCKSMITH in your spare time

There's a big demand for skilled locksmiths. You can earn big money either full or part-time in your own home. Be your own boss; earn steady, year 'round income with no layoffs. The BELSAW INSTITUTE training, recommended by professional locksmiths, teaches you to make keys, open and repair locks on homes, cars and buildings. Easy, step-by-step illustrated lessons complete with all tools and supplies. We tell you how to get servicing jobs, how much to charge, how to earn while you learn and how to build a secure cash profit business.

Mail Coupon for FREE Book Today!

BELSAW INSTITUTE, 116F Field Bldg., Kansas City 11, Mo.
Send FREE book, "Keys To Your Future!"
No obligation. No salesman.

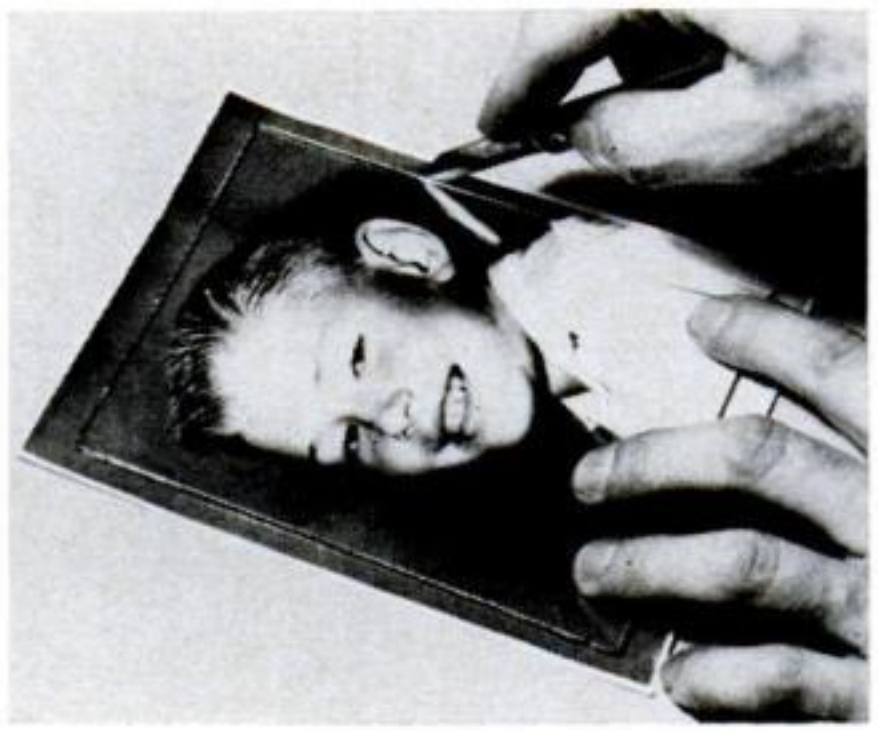
Name.....

Address.....

City.....***State***.....

SHORT CUTS AND TIPS

FROM PS READERS



Picture glass helps trim pictures

Next time you have to trim a photograph or other picture to fit a frame, take the glass out of the frame and use it as a centering and trimming guide. Lay the glass on top of the picture, move it around until it covers the desired composition, and then trim around the edges with a razor blade or sharp knife.

WILLIAM SWALLOW, Brooklyn, N.Y.

Money-saving tip for home heating

During a recent cold snap my furnace kept kicking on even when the house temperature was higher than the thermostat setting. I checked the heating system, but found nothing. Finally, I discovered cold air coming in around the thermostat. It was blowing up the wall from the crawl space and out the hole where the wires entered the thermostat. I sealed the hole with tape, and got no more wrong readings.

JERRY COOK, Addison, Ill.

Large nail doubles as small Phillips

Ever need a small Phillips screwdriver? Try grinding the sharp point off a large nail (as shown above) and using the squared nail point in the screw slot. It works well for me, and since the nail is not hardened, it should not mutilate the slots in the screwhead.

S. I. ROBERTS, Portsmouth, N.H.

Urheberrechtlich geschütztes Material

Swings open for people...and swings down for cargo

1966 Ford Country Squire

New Magic Doorgate for all our 1966 wagons!

Ford, Fairlane, and **Falcon** all offer this magically convenient invention for 1966—standard on all Ford and Fairlane wagons, optional on Falcon. Magic is the word for it. Reach for the door handle and it swings open like a door. Reach for the tailgate latch and, magically, it swings down like a tailgate. This is the kind of trail-blazing idea you'd expect from America's wagon specialist.

Yet Magic Doorgate is just a fraction of the 1966 news from Ford —builder of America's most popular wagons!

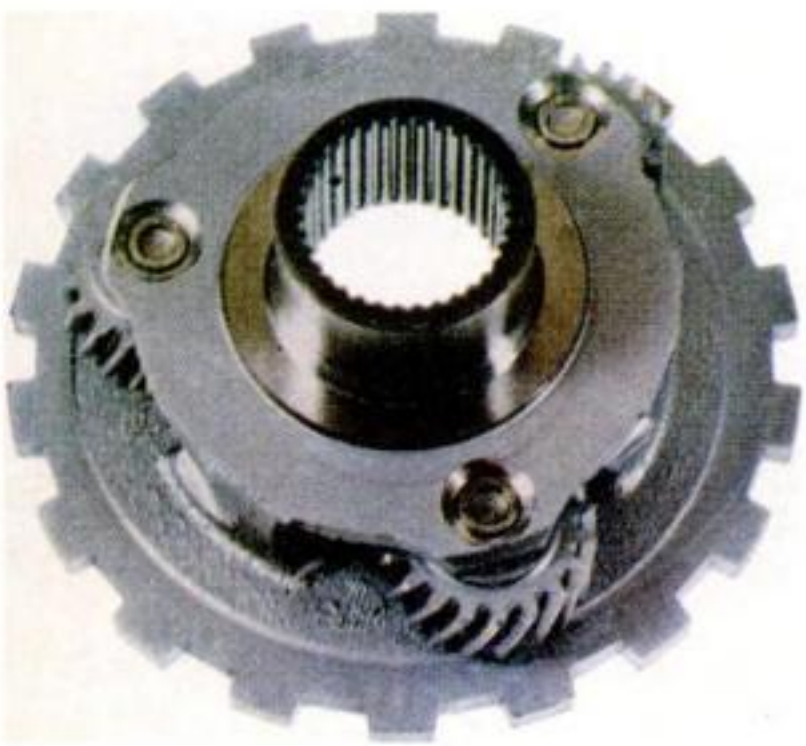
For 1966 there are 5 Ford, 3 Fairlane and 2 Falcon wagons to choose from. Fun for all the family. Beautiful enough to go anywhere. Smooth as a limousine. If you are in the market for a wagon this year—play it smart. Follow the wagonmaster. Ford!

AMERICA'S
TOTAL PERFORMANCE CARS

FORD

MUSTANG • FALCON • FAIRLANE
FORD • THUNDERBIRD

Urheberrechtlich geschütztes Material



This is a GM Original:
It comes in a GM car.

This is a GM Replacement:
It's one and the same.

That's why this GM replacement not only looks like the planetary gear carrier that helps GM transmissions work smoothly. Like every GM replacement part, it *acts* and *is* just like the GM Original.

So whatever may need servicing on your car or truck—it's always best to replace a GM Original with a genuine GM Replacement.

And when it's time for service, go where you know they use Genuine General Motors Parts. You'll know them by their easy-to-recognize, distinctive GM and United Delco packages. And you'll find them just about everywhere in the country.

GENUINE GENERAL MOTORS PARTS

GM CHEVROLET • PONTIAC • OLDSMOBILE • BUICK • CADILLAC • GMC TRUCKS United Delco

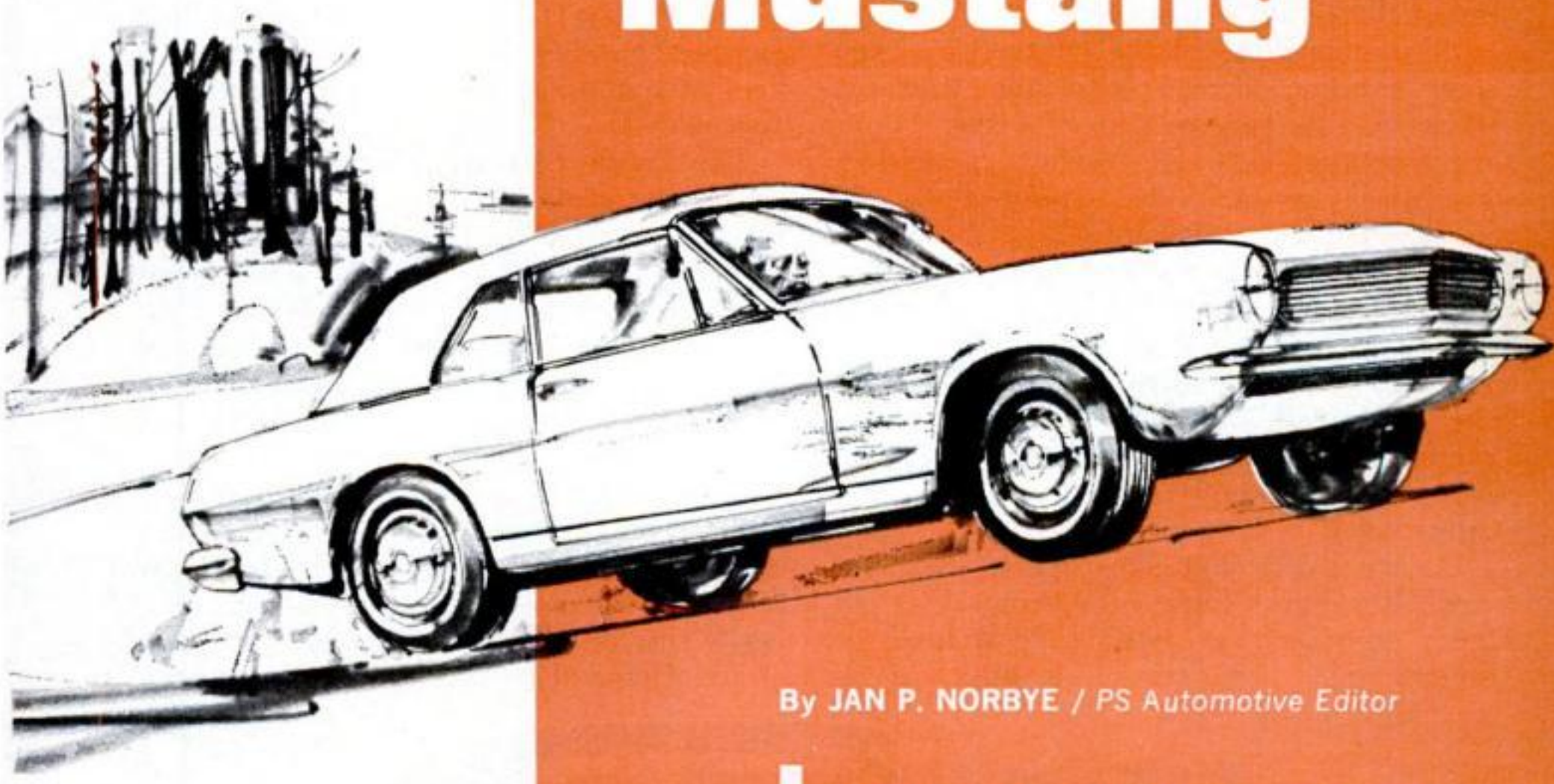
Urheberrechtlich geschütztes Material

Popular Science
REG. U.S. PAT. OFF. MONTHLY

Chevy is getting ready to pitch its Panther against Ford's Mustang in Detroit's biggest dogfight since they threw the "stovebolt six" against old Henry's Model A

SNEAK PREVIEW:

Chevrolet's New Rival for the Mustang



By **JAN P. NORBYE** / *PS Automotive Editor*

In April, 1964, Ford introduced a sporty car called the Mustang. It was an instantaneous, howling success. Chevrolet, Ford's chief competitor, has nothing like it.

But come spring, or possibly as late as next fall (Chevrolet is having tooling problems), Chevy will.

POPULAR SCIENCE here presents an exclusive preview of Chevy's "anti-Mustang." In General Motors' councils it is called the Panther.

Like the Mustang, the Panther will have a low, racy silhouette, with a long hood and a short rear deck. It will be

Continued

Engineering short cuts were made by using Chevy II parts in the

muscular, with horsepower options streaking all the way up to 350.

Chevy was in a hurry to build a car to compete with the Mustang. Just as Ford built the Mustang from a batch of Falcon parts in a different body, Chevrolet decided to use the Falcon-inspired Chevy II as a basis for the Panther.

The Chevy II underbody, according to an "inside" source, was shortened to cut the wheelbase from 110 to 108 inches. Rear overhang was reduced, front overhang increased. The seat positions were rearranged to give the long hood and very short rear deck. The floor was lowered and the transmission tunnel raised to get a low seating position. All interior dimensions were carefully worked out so the Panther would have from 1/10 inch to a full inch on the Mustang in every respect. (That will give the Panther an advantage over the Mustang circa 1966 in head room, leg room, and so on, but not for 1967, as we shall see in a moment.)

The proportions of the Panther are even more extreme than those of the Mustang. There will be two versions of Fisher's unit-construction body, a convertible and a notchback coupe. The fender lines are softer than the Mustang's and there's no side sculpturing in the normal sense of the word, but a curious "lip" trails from the front fender into the door. The doors are low and wide. Chances of a fastback Panther are small, but don't rule it out completely. Remember that Mustang's fastback came out six months after the car was first announced.

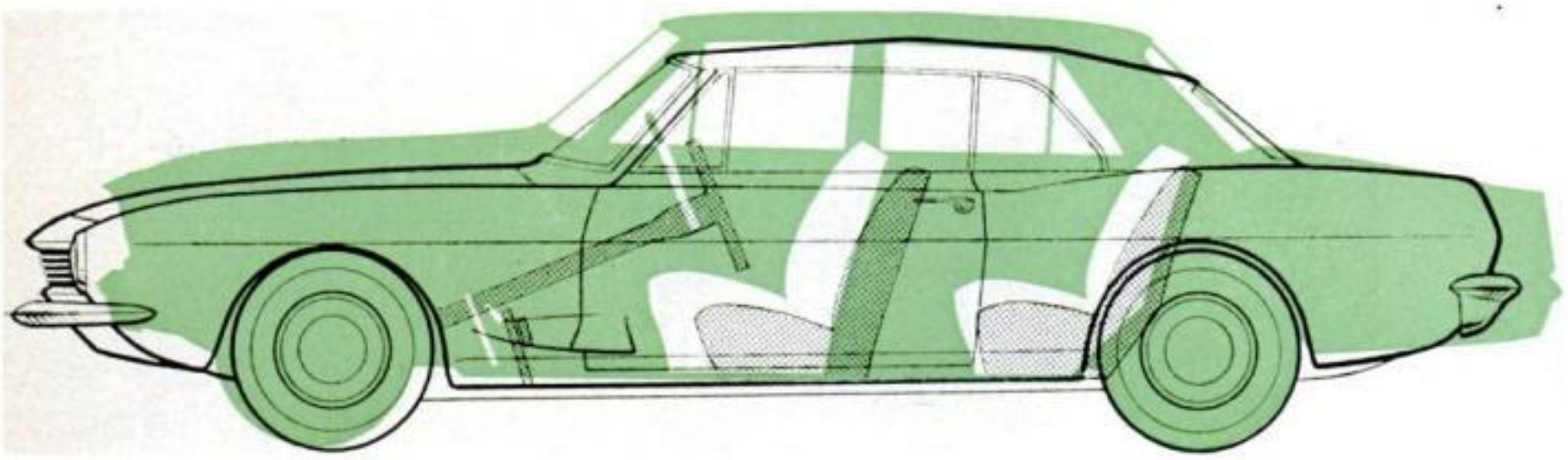
As usual with unit construction, the body cowl structure forms the central, rigid basis to which everything is welded or bolted. The front section is built up on two side rails that carry the engine mounts and fender skirts. The one-piece skirts carry attachment points for the suspension arms and are formed to embody spring towers. There is no conventional cross member between the front wheels. This gives a wide and deep engine berth and facilitates installation of a wide range of power units.

Drag struts added. Chevrolet took a hint from Cadillac by putting a drag strut in the front suspension of the '62 Chevy II. A drag strut is a steel rod anchored in rubber bushings at the wheel end of the lower control arm on the body side rail ahead of the wheel. It is used in conjunction with a simple lower control arm that does not resist horizontal movement of the wheel hub. The drag strut provides some horizontal compliance, and the suspension system proved so successful that a drag strut was incorporated in the all-new '65 Impala.

The Chevy II front suspension was fitted on the Panther with minor changes in geometry and spring rates, and a stabilizer was added.

The Panther's rear suspension, I understand, is also lifted straight from the Chevy II—including the single-leaf, tapered springs. The advantages are low weight and total absence of interleaf friction, but there is little or no cost saving involved. The manufacturing process includes shaping, rolling on cam-shaped rolls, and shot-peening under stress.

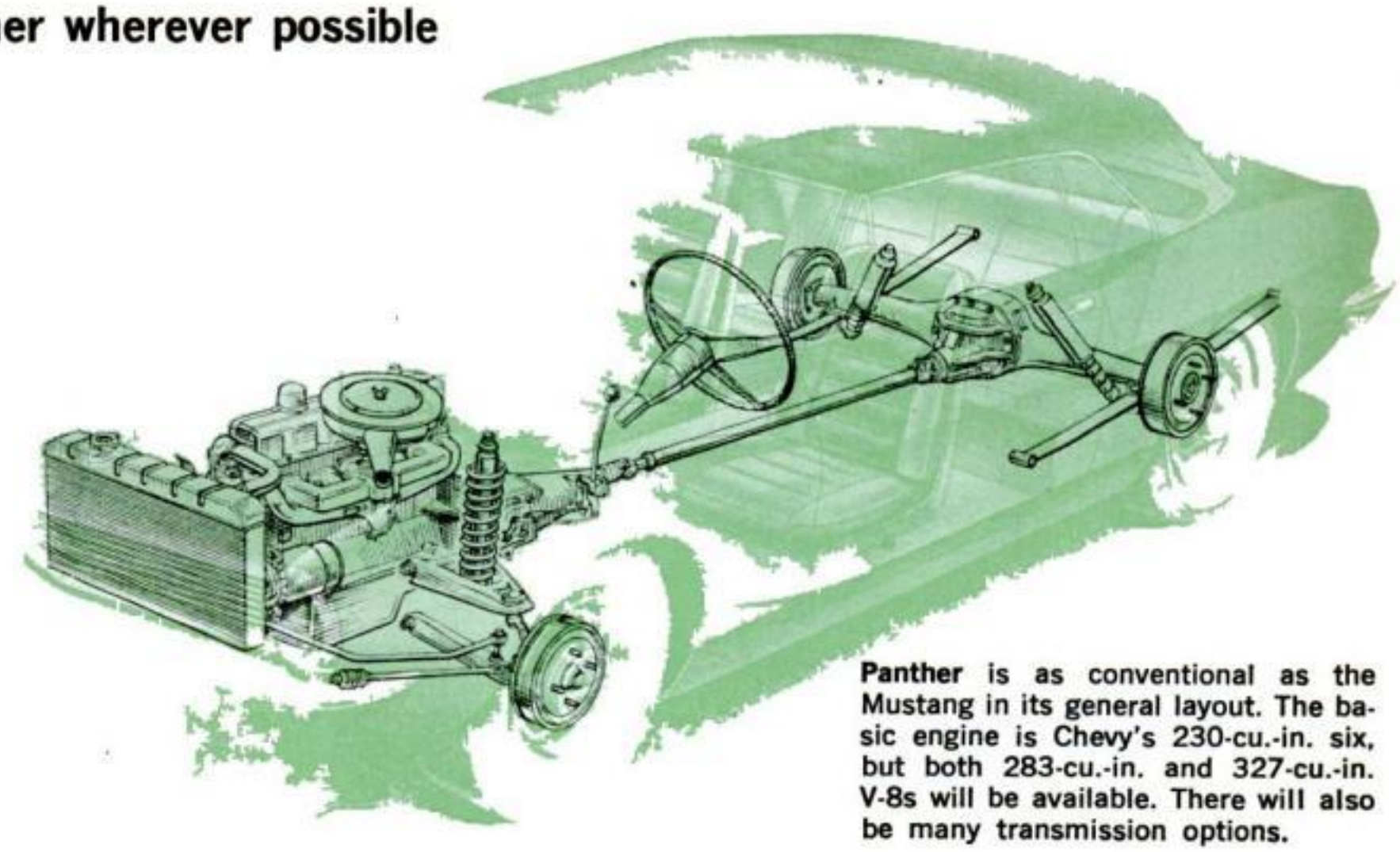
By sharing components with the Chevy II, the Panther is assured of high interchangeability of parts and access to a mass of performance options. It automatically inherits the simplified maintenance schedule of the Chevy II. And the Panther is said



Design differences between Panther and Chevy II (color) are significant. Panther seats are lower, but mounting engine far forward and keeping trunk short has helped provide leg room both front and rear.

Urheberrechtlich geschütztes Material

Panther wherever possible



Panther is as conventional as the Mustang in its general layout. The basic engine is Chevy's 230-cu.-in. six, but both 283-cu.-in. and 327-cu.-in. V-8s will be available. There will also be many transmission options.

to be even smaller, lighter, and easier to drive and park.

Panther assembly is planned for the huge Willow Run plant, where Chevy IIs and Corvairs now roll off the line. Production capacity is assured for any quantity the Chevrolet sales organization can sell.

Reports say the basic Panther engine is Chevy's 230-cu.-in. six, and the V-8 options closely parallel those of the Chevy II (283 and 327 cu. in.—up to 350 hp.). There is no indication that the Chevy II four-cylinder unit will be available, but there are rumors that Pontiac's overhead-cam six may become optional in 1967.

Full choice of transmissions. Chevrolet's transmission plant in Muncie, Ind., makes both three- and four-speed synchromanual transmissions, and the Panther will offer a full choice of transmissions with all engines. The automatic transmission will probably be Powerglide to begin with, but the word is that Buick's Super Turbine 300 (from the Skylark series) will replace it. The Mustang has a three-speed Ford-O-Matic; the Panther will need something better than the two-speed Powerglide.

Couldn't they produce a low-cost four-seater Corvette? No—fiberglass bodies are best suited to low-volume lines. And the brake system and independent rear suspension cannot be built cheaply. Then what about a hotted-up Corvair? No—the air-cooled flat six is at the end of its performance potential. The best it can do with four carburetors is 140 hp. Its output with turbocharging is 180 hp. (with little or no torque under 4,000 r.p.m.). Clearly, the Corvair engine is no match for the Mustang's 200- and 225-hp. V-8s, let alone the 271-hp. high-performance version.

Chevrolet's late start on the Panther program made it impossible to get it on the market as a 1966 model. It will probably be a 1966½, due for debut in February or March. This timing, however, gives the Panther only six or eight months before the new Mustang comes out. The 1967 Mustang will have a longer wheelbase and wider track, improved rear seating, and revised styling. Since the 1966 Falcon went on the assembly lines, the Mustang suspension systems are orphaned (not shared with any other model), and this will be corrected on the 1967 model. Next year's Mustang chassis will be brought in line with the new Falcon.

In 1967 the Panther will run not only into a significantly improved Mustang but also into a low-slung fastback from Mercury called S-77. Ford created this market segment, and won't give any of it away without a fight.

The Panther will be Chevrolet's sixth distinct model line (Corvair, Chevy II, Panther, Chevelle, Chevrolet, and Corvette). No matter where public preference goes, Chevrolet intends to provide the right kind of car. PS

Urheberrechtlich geschütztes Material

Pseudoscientific machines and gadgets of all types play a large role in the weekly U.N.C.L.E. episodes. Here, Thrush villainess Elsa Lanchester readies for action an impressive "brain-killing" machine.

Armed to repel the forces of evil, Robert Vaughn and David McCallum (Napoleon Solo and Illya Kuryakin) grip U.N.C.L.E. and Thrush guns, two weapons drawn from the exotic armory shown at right.

Crazy Gadgets of "THE MAN FROM U.N.C.L.E."

By W. STEVENSON BACON

If you're among the growing millions of devoted U.N.C.L.E. fans, you've probably watched breathlessly as agents Napoleon Solo and Illya Kuryakin (Robert Vaughn and David McCallum) week after week crush the evil agents of Thrush with the most fantastic and dangerous-looking assortment of guns and gadgets imaginable.

The weapons and other gimmicks look real—so real that a brigadier general in Army Ordnance was recently led to write to U.N.C.L.E. headquarters to ask for working models. These he proposed to test "in the interest of national security." And, if that wasn't enough, Ideal Toy has been selling exact replicas of the U.N.C.L.E. gun by the thousands at $4.99, and has just introduced Thrush guns for those youngsters who want to play "the bad guys."

Despite all the acclaim, prop man Bob Murdock and special-effects men George Schwartz, Jack Schwartz, and Marcel Vercoutere (all of whom just won the special-effects "Emmy" for the aforementioned U.N.C.L.E. and Thrush exterminators) are very modest.

"We just dream up the gadgets as we need them," Murdock relates. "Sometimes we have just 30 or 45 minutes to go before the show is due to be taped, and we use whatever we can put our hands on. When you're asked—and with a straight face—for a 'camera' that's really a gas gun, a pocket mine detector, or a three-meter cyanide bomb, you have to think fast."

Despite Murdock's disclaimer of authenticity in props (only the show's guns are the "real" thing), I had to see the pocket radios, pen lasers, and ultrasonic brain crushers to be convinced. Now I know:

Urheberrechtlich geschütztes Material

Napoleon Solo and Illya Kuryakin fight their way out of tight spots with dry-ice "gas bombs," wooden "radios," and, in a pinch, a photoflash "radar" unit. But if these gadgets don't quite do all they *seem* to do, they do one thing supremely well: They demonstrate creative, spur-of-the-moment gadgeteering of the highest order.

The air-wave whisper. Want to talk to Mr. Waverly (Leo G. Carroll) from any place in the world? Use the U.N.C.L.E. cigarette-case "radio"—a tiny chassis with miniature speaker grille, dial, and alligator clip. If fits into the case along with five camouflaging cigarettes. Local communications between Napoleon and Illya are handled via a "fountain-pen radio"—an aluminum tube with a tiny wire "microphone" grille at one end and a 2½-inch "antenna" at the other. Both mike and antenna collapse into the tube, and a standard tip screws into it. "Radios" for Thrush agents ("We never put as much work into the bad guys' equipment," says Murdock) are made from old TV antennas and other miscellany.

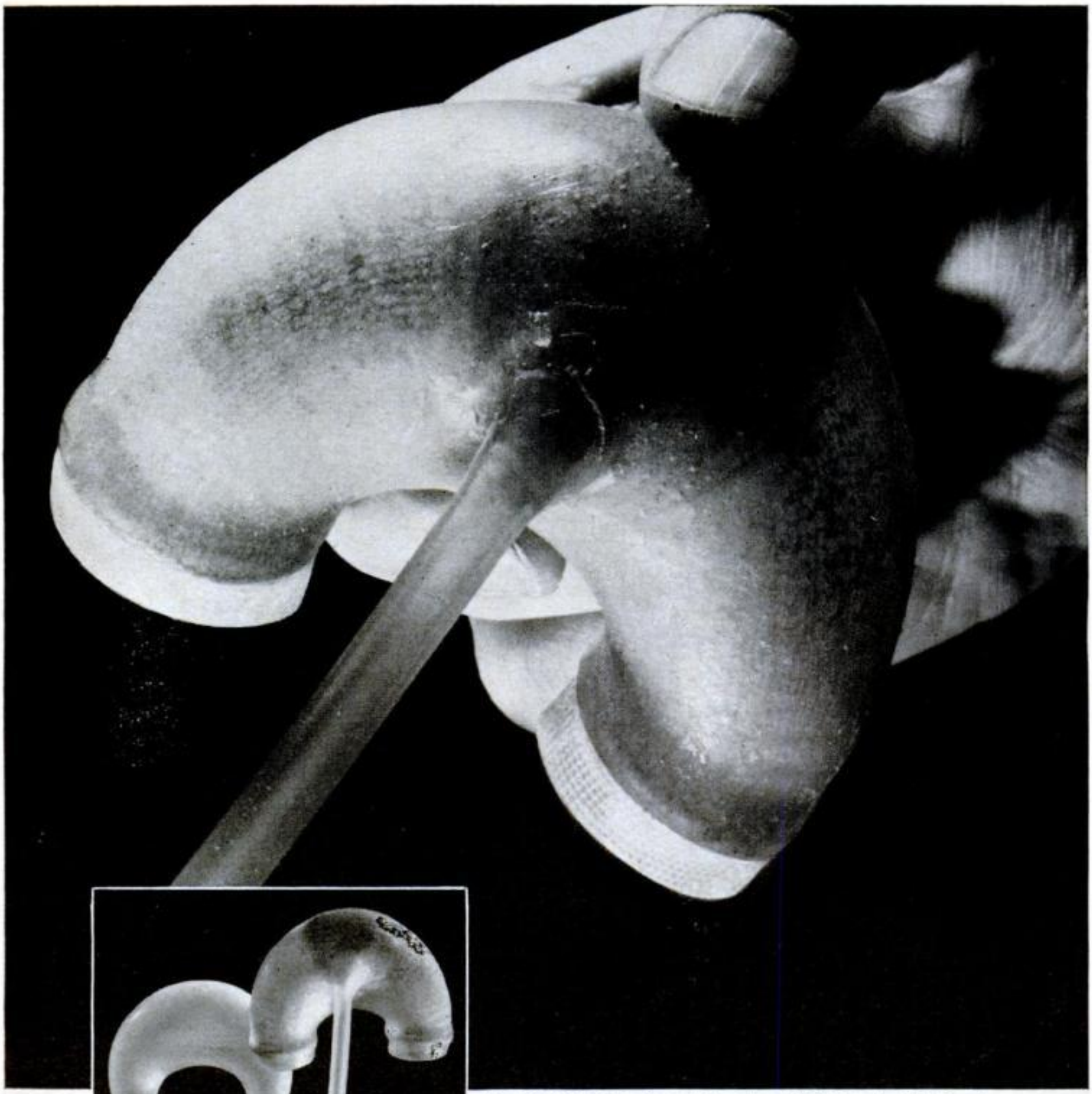
Other communications gear includes a photoflash-reflector "radarscope" that fits on a fake radio with a suction cup, and a tape recorder—this last, genuine.

The big bangs. Perhaps in no other area has as much ingenuity been demonstrated by Murdock and his associates as in the "bomb" department. All types—gas and explosive—triggered by heat, impact, timers, and radio signals, regularly wipe out those who would destroy world peace. One bomb designed especially for U.N.C.L.E. agents consists of a hollowed-out wood block. Just set the timer—a dummy knob and dial—

[*Continued on page 186*]

Urheberrechtlich geschütztes Material

BOOSTER PUMP
gives new life



Knackwurst-size heart booster held by technician in photograph above consists of a Dacron outer hard shell (inset at left), to which an air-pressure hose is connected, and a flexible-plastic inner bulb.

Urheberrechtlich geschütztes Material

Auxiliary heart boosters will soon be saving thousands of lives—and many more will be lengthened by amazing new pumps that replace the heart itself

to failing hearts

By C. P. GILMORE

On the table, a knackwurst-size plastic bulb jerked sharply in time to bursts of escaping air—once each second. Blood-colored liquid sluiced through a network of glass tubes attached to the odd apparatus.

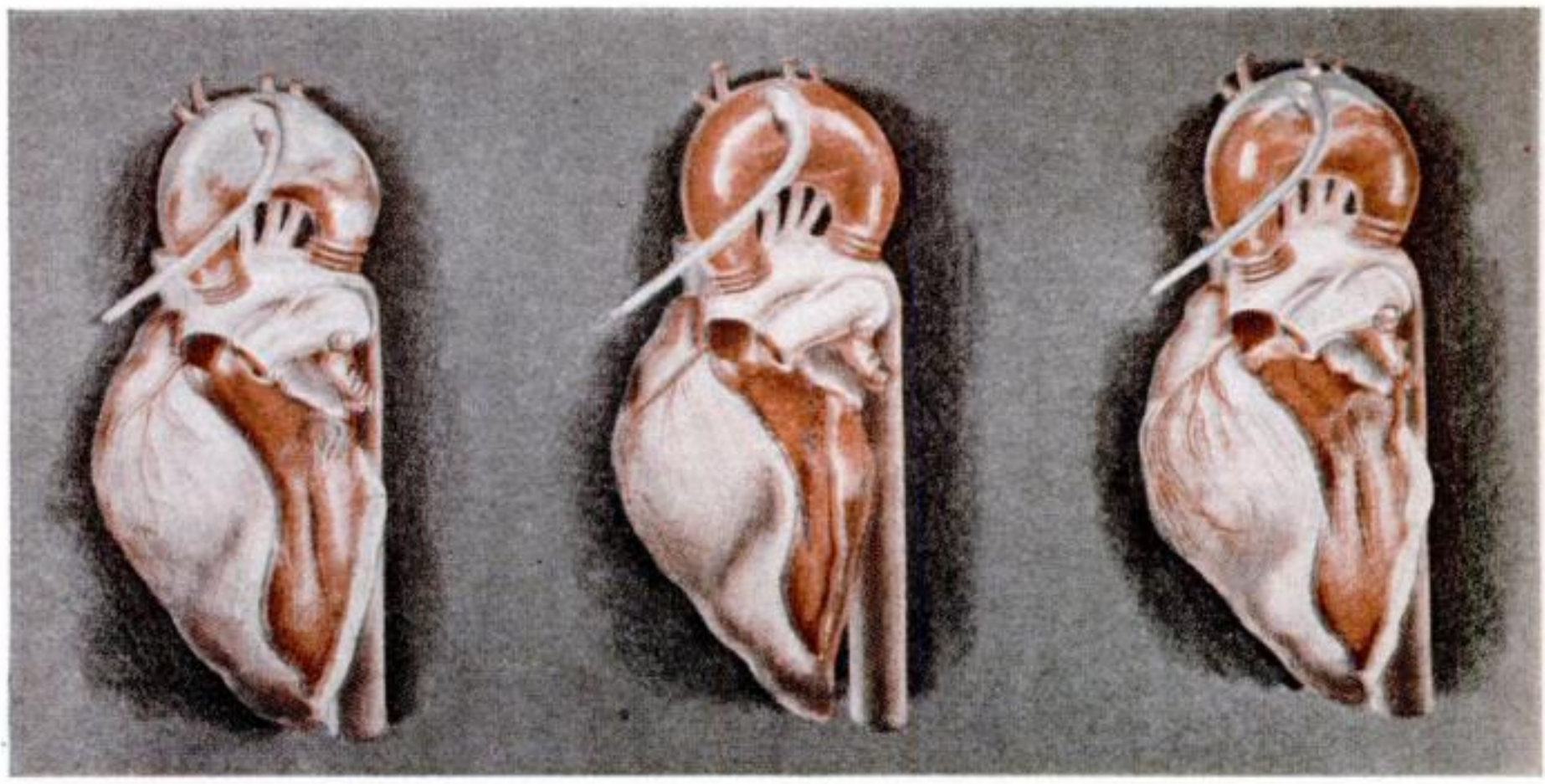
For more than a year this weird mechanical ballet has moved through its monotonous routine. The plastic bulb—a sophisticated new kind of pump—has proved its endurance. Soon, perhaps before you read this, an identical pump will be surgically buried in the chest of a human patient dying because his heart can't pump enough blood to keep his body alive. The plastic pump—a heart booster—will take over half of the natural heart's job, giving the failing organ desperately needed help.

This startling new device, which I saw early last August at Avco-Everett Research Laboratory near Boston, is one of several similar devices now being developed around the country. They are hastening the day when an entire artificial heart can be implanted in a human being. Such devices have worked in experimental animals for months.

"We have two or three patients a week who die of cardiac insufficiency in this hospital alone," says Dr. Adrian Kantrowitz, chief of surgical research at Brooklyn's Maimonides Hospital and co-developer of the heart booster, "and thousands of others die elsewhere. With the booster we can give hearts more pumping power. Many of these people won't have to die."

Most persons have some reserve capacity, Kantrowitz says. Your heart can pump two to three times as much blood as you normally need. In times of violent exercise

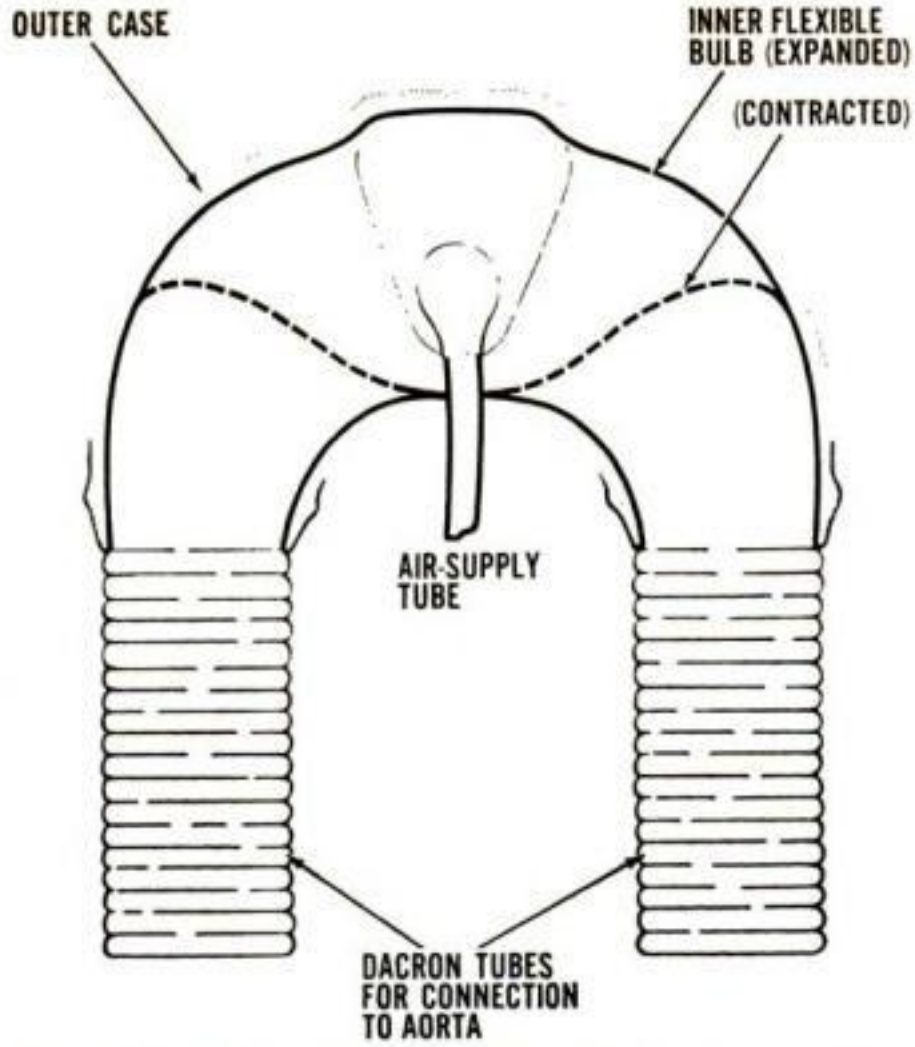
Continued



The heart booster in action: Booster (left) is attached to the aorta. Its inner tube has just contracted, driving blood down through the aorta and out into the body. The heart, simultaneously, has been expanding, drawing in new blood. The heart valve opens (center) as the organ contracts to drive blood out. Inner booster bulb expands and fills with blood. Process is then repeated (right).

Urheberrechtlich geschütztes Material

Technician gives a completed booster a final examination with a magnifying glass. Air-pressure tube is clearly visible, as are the accordion-like Dacron tubes used in suturing the heart in place.



Blast of air in space between rigid and flexible bulbs makes inner bulb contract, squirting blood through arteries. When air is sucked out of the space, inner bulb expands and draws in blood.

—when you sprint for a bus or play tennis —your heart pumps faster to supply the oxygen the muscle cells need. But gradually, as the heart muscle ages, the heart loses its reserve power.

"Sometimes a patient will get to where his heart has maybe 10-percent reserve," says Kantrowitz. "He gets dizzy when he walks up a flight of stairs. Then his reserve drops to five percent. Finally he's got no reserve. His heart can barely keep him alive. Then heart capacity drops to 99 percent of what he needs. That day he dies.

"With the heart booster, we can increase the heart's pumping power by 50 percent. That means we can give these people an extra 10 to 15 years of life."

The heart booster may save many heart-attack victims, too. When a patient has a coronary attack, his heart muscle is badly damaged. Yet it must continue to pump enough blood to keep him alive, and at the same time heal itself. Frequently, it's not strong enough to do the job and the patient dies. With a booster to take over much of the job of pumping blood, the heart would have a better chance of recovery.

I first saw a heart booster in action last February at Maimonides Hospital. Dr. Franz Gradel was bent over the patient—a yellowish-brown mongrel dog. In a two-hour operation, Gradel and his assistants installed a heart booster across the inverted U made by the aorta—the great artery that supplies blood to most of the body. A thin tube ran from the booster to a pump on a table nearby. The surgeons hooked two wires directly to the dog's beating heart, and connected them to an electronic control panel next to the table pump. Then, as the dog's heart beat, the control unit on the table picked up the heart's faint electrical signals and used them to pulse the booster in perfect synchronism with the dog's natural heart.

Bulbs do the job. The heart booster was a joint development by two brothers, Dr. Adrian Kantrowitz, and Dr. Arthur Kantrowitz, a physicist and director of Avco-Everett Research Laboratory. The basic unit is a rigid plastic bulb with a flexible bulb inside. A blast of air in the space between the rigid and flexible bulbs makes the inner bulb contract, squirting 50 cc. —a hefty whiskey jigger—of blood through the arteries. When the air is sucked out of the space between the bulbs, the inner bulb expands and draws in blood.

Experimental artificial heart devices had been designed before. But most used valves to make blood flow in the proper direction. And valves invite fatal blood clots. The Kantrowitz brothers solved this problem in

Urheberrechtlich geschütztes Material

the simplest possible way: They left the valves out. They used, instead, the heart's own valves.

Valveless advantage: The heart booster doesn't have to operate continuously. If a patient improves, he can simply switch it off.

The air-pressure tube that drives the booster and the heart wires that control it are attached to the external power unit through a connector mounted in the chest. Holes in the skin have always been a problem; they invite infection. But the Kantrowitz team solved this problem by designing a plug shaped like a checker piece with a Teflon groove around its edge. Skin grows into the groove, effectively making a germproof barrier. Then leads from the power unit can be plugged into the chest socket like a lamp cord into a wall.

Getting blood to clot. Early models of the booster worked successfully in dogs, except for one thing. "The difficulty," says R. T. Jones, who assisted in the booster's design, "comes where the Dacron sleeves—the pipes on each end of the booster that are sutured to the aorta—are attached to the bulb. Now you *want* blood to clot inside the Dacron tube and tissue to grow. But you want the clotting to stop right as it gets to the bulb."

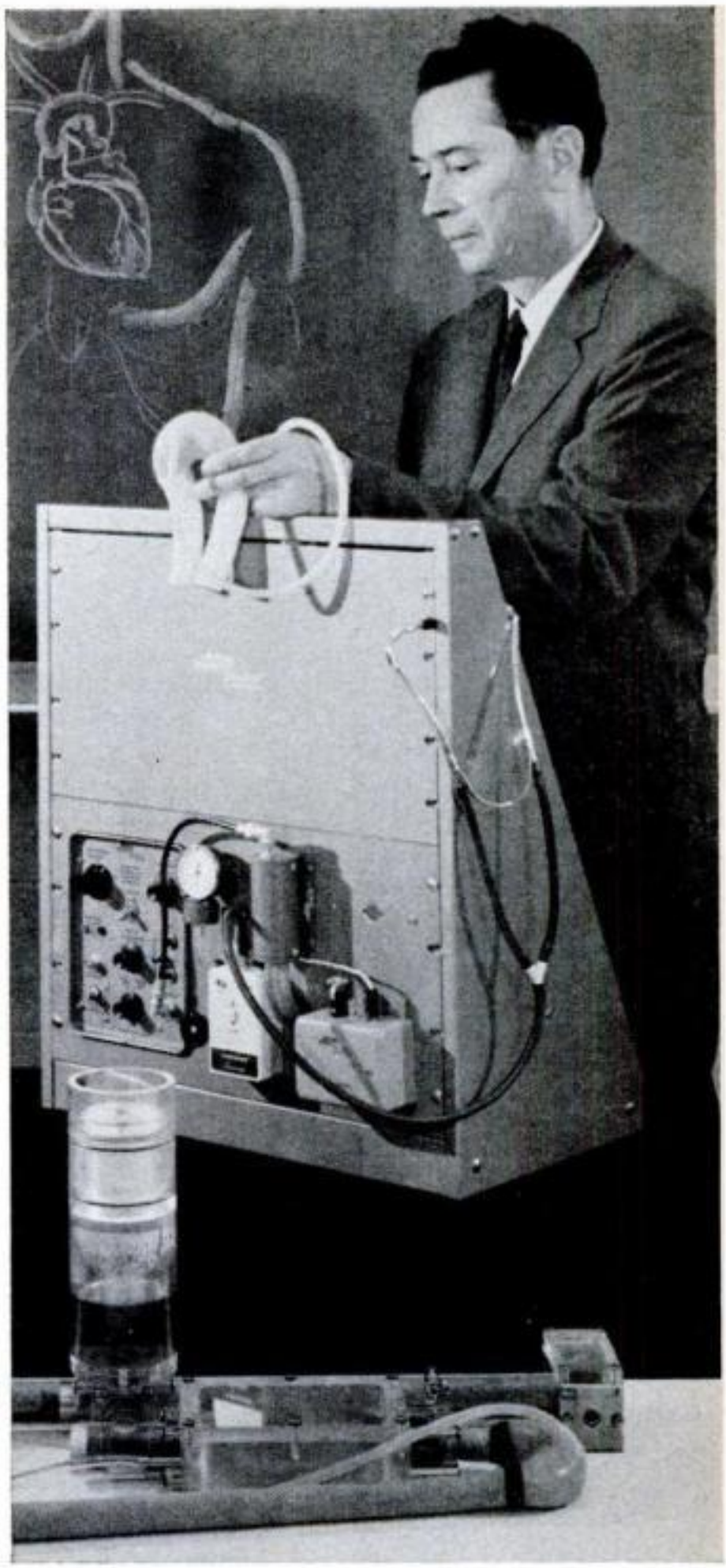
Today, with the design set to do just that, the critical job of building the first models for human patients is under way. It's a painstaking process. The whole job takes more than three days. And many boosters, hand-made by Jones or his assistant, are rejected.

Devices developed by other research teams are progressing, too. Houston's famed heart surgeon, Dr. Michael DeBakey, has built several kinds of auxiliary hearts. He installed the world's first artificial heart pump in a human patient on July 19, 1963. The man lived for four days, then died of a combination of troubles complicated by pneumonia. The artificial heart, though, worked perfectly.

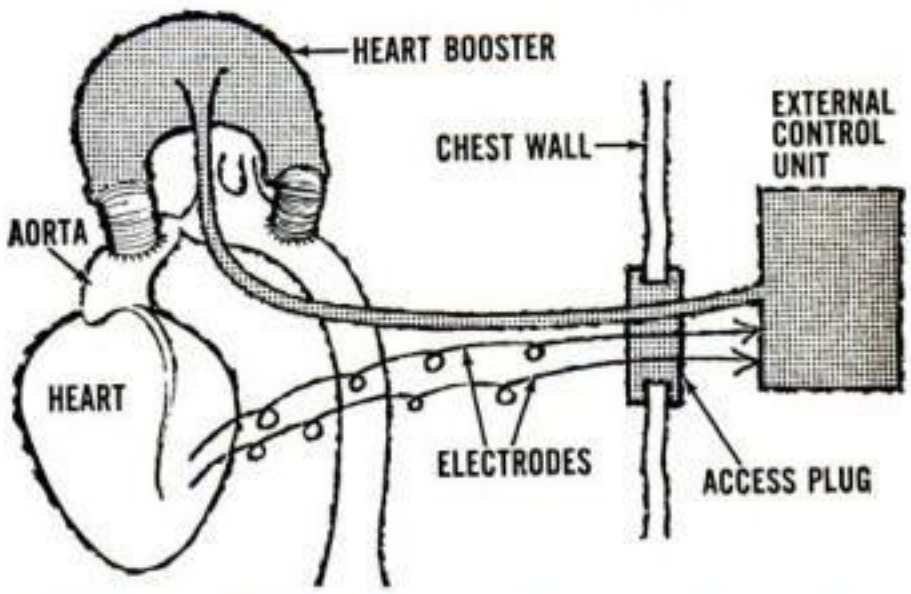
Dr. DeBakey has developed a number of other devices, including one to replace the entire heart, with which he kept a dog alive briefly last April.

Great strides in the whole-heart replacement field are also being made by Dr. Willem J. Kolff of the Cleveland Clinic Foundation, who developed the artificial-kidney machine. One of his early efforts

[*Continued on page 194*]

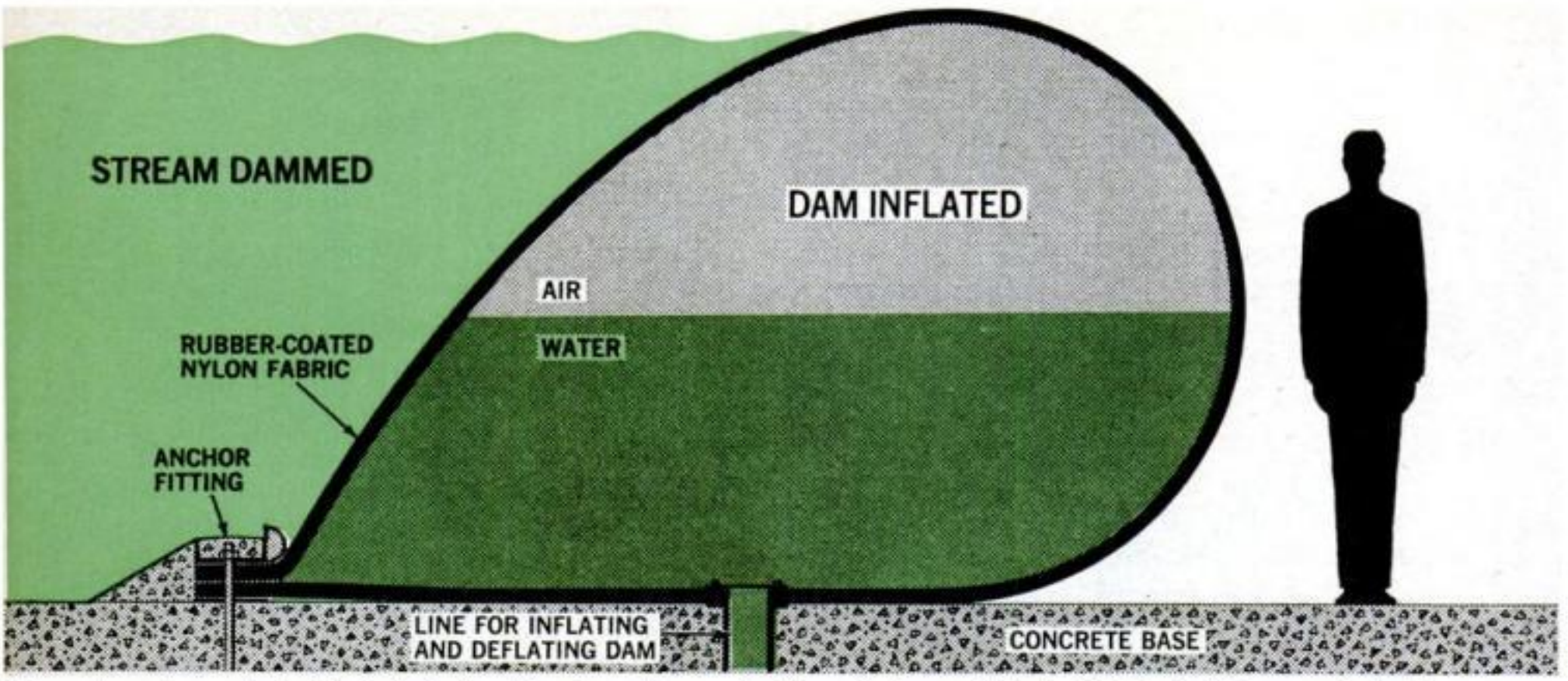


R. T. Jones holds a model of the heart booster, which is shown here attached to laboratory equipment used to study the problems of blood flow.



Electronic control unit (right) will be wired directly to a patient's heart. The control's wires and air tube will pass into the body through a plug.

Urheberrechtlich geschütztes Material



When dam is wanted, it's inflated—with air, water, or both. Water-air combination (above) will serve in biggest dam of kind, 2,000 feet long and eight feet high, across Susquehanna River at Sunbury, Pa.

A VERSATILE [illegible]

that comes...and

A dam that comes and goes will give Sunbury, Pa., a 3,000-acre lake for swimming, boating, and fishing. Spanning the 2,000-foot-wide Susquehanna River, it will consist of seven inflatable sections of rubberized nylon fabric, closing gaps between concrete piers spaced about 300 feet apart.

Inflated to eight-foot height with water and air, the state-built dam will back up the lake from late spring to early fall. Then, collapsing like a flat tire, the deflated dam will let early-spring floods by without risk of inundating nearby land.

Sunbury's dam will be the biggest of an inflatable design invented in 1956 by a Los Angeles engineer, N. M. Imbertson, and put into production by Firestone Tire & Rubber Company's Coated Fabrics Division—which calls them Fabridams. So far, 23 have been erected in the U.S., and several abroad. They make controllable barriers of many uses—to divert water for irrigation, boost the level of a reservoir or the head above a hydro plant, or block salty tides' intrusion in coastal-lowland streams.

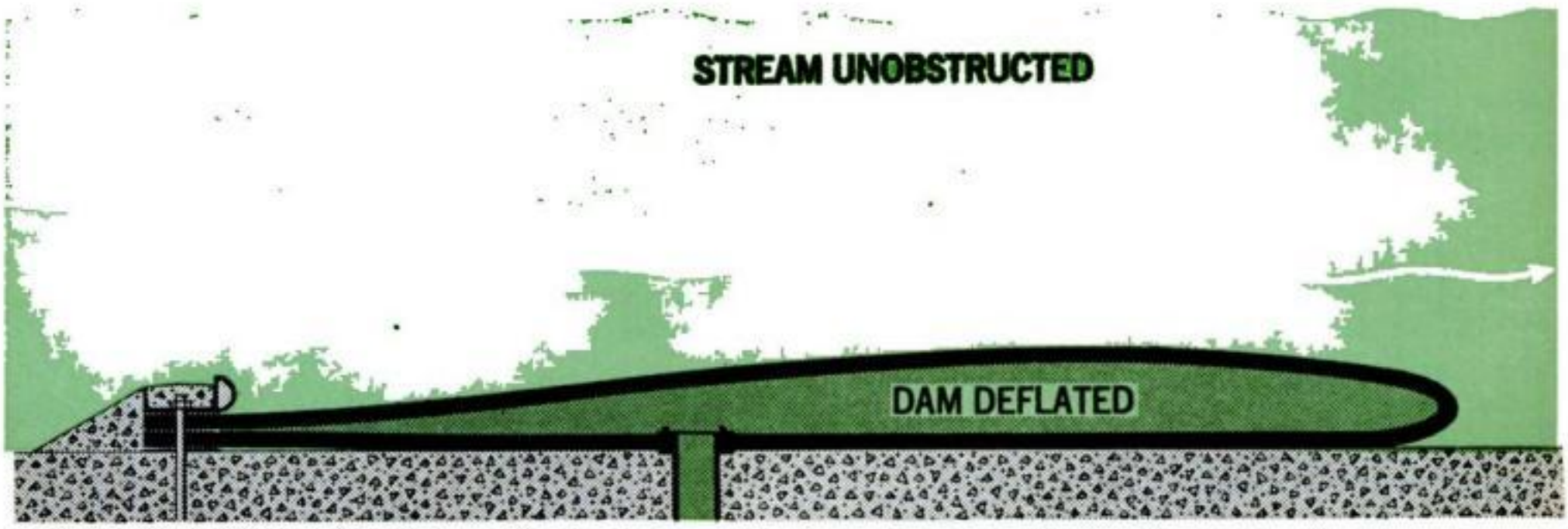
A Fabridam employs one or more fabric sections up to 400 or 500 feet long. Folded back on itself, the fabric forms a bag that, when inflated, balloons to a teardrop-shaped cross section up to 15 or 20 feet high. Special fittings bolt it securely to a flat concrete foundation.

Fabridams may be inflated with air, water, or both. Water gives extreme accuracy in controlling height. Air reduces cross section and cost, and speeds inflation and deflation. The Sunbury dam illustrates a favored compromise: half air, half water. Low pressure, less than two pounds to the square inch, suffices. A leak from an accidental puncture would be slow and easily stopped by a patch before damage was done.

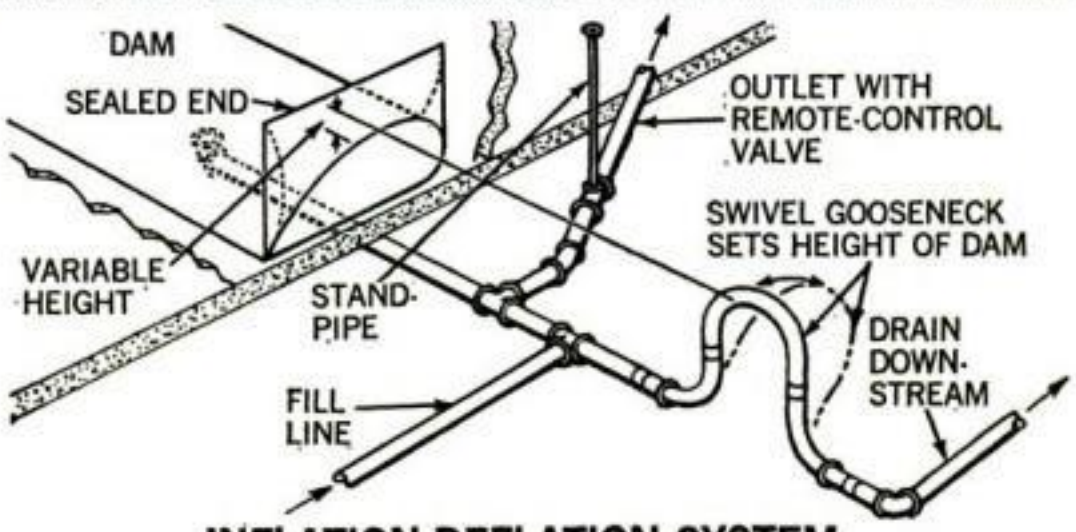
Material ranges with a dam's size from lightweight two-ply fabric up to heavy-duty four-ply fabric, called more than twice as puncture-resistant as a standard four-ply auto tire. Weather-withstanding neoprene coats the nylon fabric. According to the makers, a Fabridam has a life expectancy of about 20 years.

Urheberrechtlich geschütztes Material

Inflatable balloons of rubberized fabric make a controllable barrier that backs up a river—or gets out of the way when floods come along



When dam isn't wanted, it's deflated (above), as Sunbury dam will be to let early-spring floods past. Smaller drawing, right, shows how water-filled dam can be adjusted to desired height, by varying tilt of gooseneck in drain.

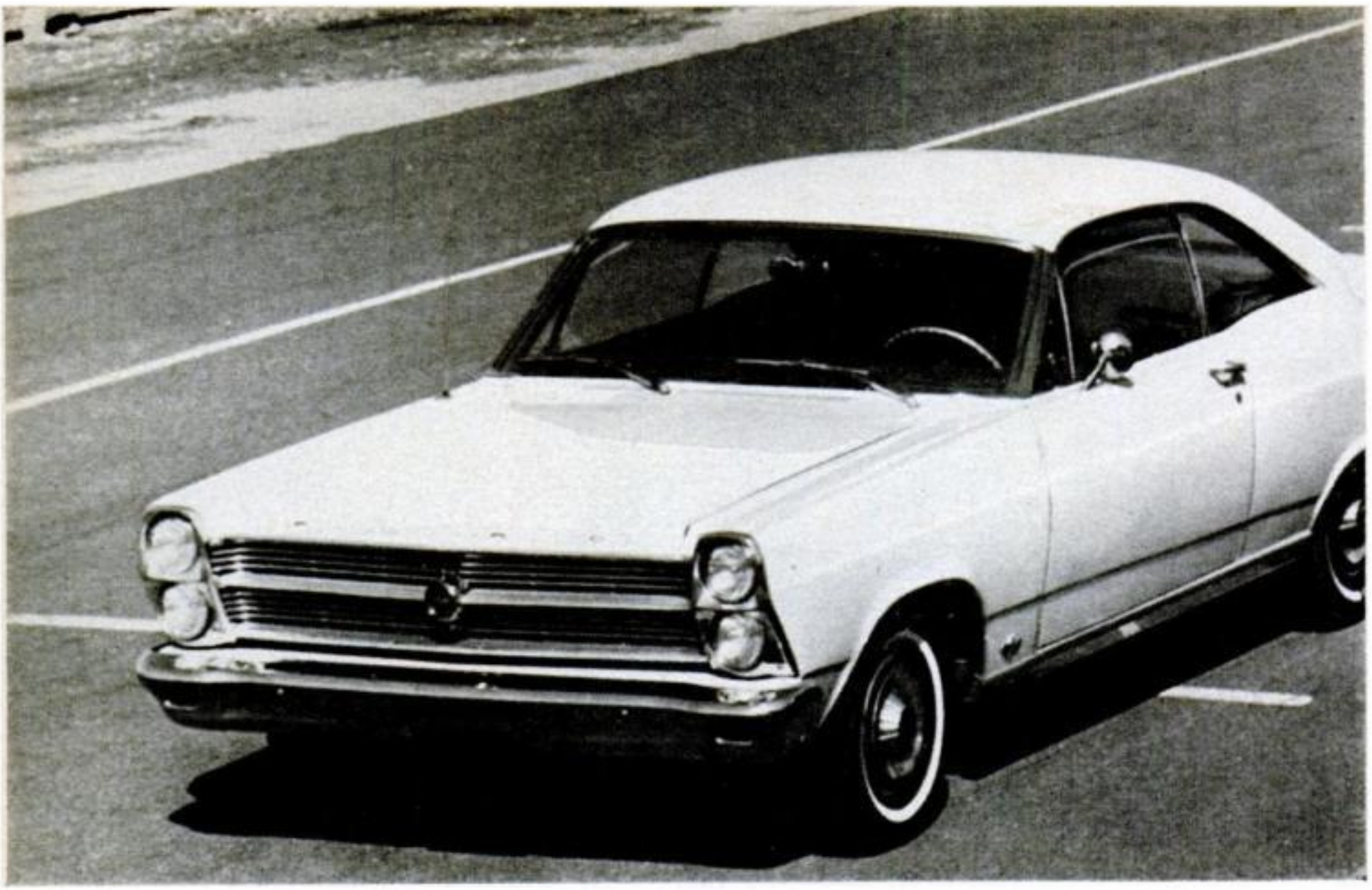


INFLATION-DEFLATION SYSTEM

goes away

You can walk along top of dam when it's inflated. This one in Hong Kong diverts water from a river to a filtration plant—but, when monsoons bring flash floods, collapses to let river safely by.

Urheberrechtlich geschütztes Material



New Ford goes to softer roof and fender lines, while new Plymouth has crisp and well-defined

REPORT FROM THE DRIVER'S SEAT

Ford Fairlane vs.

The newest of the intermediates are tremendously improved—but they also have shortcomings

BY JAN P. NORBYE / *PS Automotive Editor*
EXCLUSIVE PHOTOS BY BILL MORRIS

One of every four cars sold in 1965 was an "intermediate"—an automobile bigger than a compact yet smaller than a full-size car. The in-between cars have not only invaded the compact-car market in a big way but have also stolen sales from the larger models. The intermediates may

Ford Fairlane—a 200-hp. job as tested—is also available with engines to match its rival.

Urheberrechtlich geschütztes Material

lines. Both are agile in traffic, lively on the road, and roomy as a full-size car 10 years ago.

Plymouth Satellite

go on to new triumphs in 1966, for they are all improved this year.

The middle-size cars that show the most sweeping changes in 1966 are two pairs of twins: Ford's Fairlane and Mercury's Comet, Plymouth's Belvedere and Dodge's Coronet. We picked one of each pair for test-driving —a Fairlane 500 hardtop and a Belvedere coupe called the Satellite.

The '66 Fairlane is a totally new car with only the engine and transmission the same as last year's. The Satellite *looks* completely new, but the suspension systems as well as the power trains are carried over from previ-

Continued

Plymouth Satellite covered standing quarter-mile in two full seconds less than the Fairlane.

Urheberrechtlich geschütztes Material

They're roomy inside, agile in traffic, lively on the road, easy

Ford instrument panel shows gauges, but many of today's drivers like warning lights. I'd like both.

Plymouth speedometer reads easier, but tachometer is out of sight. Seat backrest lacks adjustment.

ous models. Both are very good cars, and they are surprisingly alike in many ways. I also found many differences.

Both cars are agile in traffic, lively on the road, easy to park, and as roomy as a full-size sedan was 10 years ago. Overall, the Ford is slightly shorter and narrower. But both are built on a 116-inch wheelbase, will seat six (or five, with bucket seats up front), and have huge trunks. Interiors have a fresh look. I particularly liked the Fairlane's door panels and the Satellite's headliner.

At the wheel. I was quite comfortable in both cars. Seat height is a good compromise between the desire for low and sleek body lines and the need for a good view in all directions. The steering wheels were set a little too high for my liking.

At 60 m.p.h., the speedometers were accurate within one percent. However, the neat-looking Ford instrument panel holds only the speedometer and a fuel gauge, while the Plymouth adds an ammeter and a temperature gauge. Surprisingly, the shorter Fairlane has the most leg room up front (but the Satellite gives you more room at back). The Ford's accelerator is suspended, which makes for better throttle control—but actually there's little to choose between the two.

On the road. Turning that 325 hp. of the Plymouth loose all at once is like uncapping a volcano. The big V-8 is remarkably quiet, however, and it's so flexible that it can pull the car in top gear at 400-500 r.p.m.

The Fairlane buyer, of course, can get similar performance by ordering a hot 390-cu.-in. V-8. Our test car had a plain 200-hp. 289-cu.-in. engine, which is powerful enough for all normal traffic situations. Plymouth has no exact counterpart to this engine—Belvedere offers a slightly less powerful 273-cu.-in. V-8 and a slightly more powerful 318-cu.-in. V-8.

The Satellite came with a manual four-speed floorshift, while our Fairlane had Cruise-O-Matic drive. This year Chrysler Corp. is making its own shift linkage, which falls far short of the Hurst linkage previously used on the excellent all-synchro transmission. The throws are too long, and the lever is placed too far forward.

During our acceleration tests, the Satellite

Ford Fairlane is an understeerer on hard turns, but is completely predictable and obedient to the driver.

Plymouth Satellite corners with great verve, but the tail end of the car tries to go wide (oversteer).

Urheberrechtlich geschütztes Material

to park. The weak spot: brakes

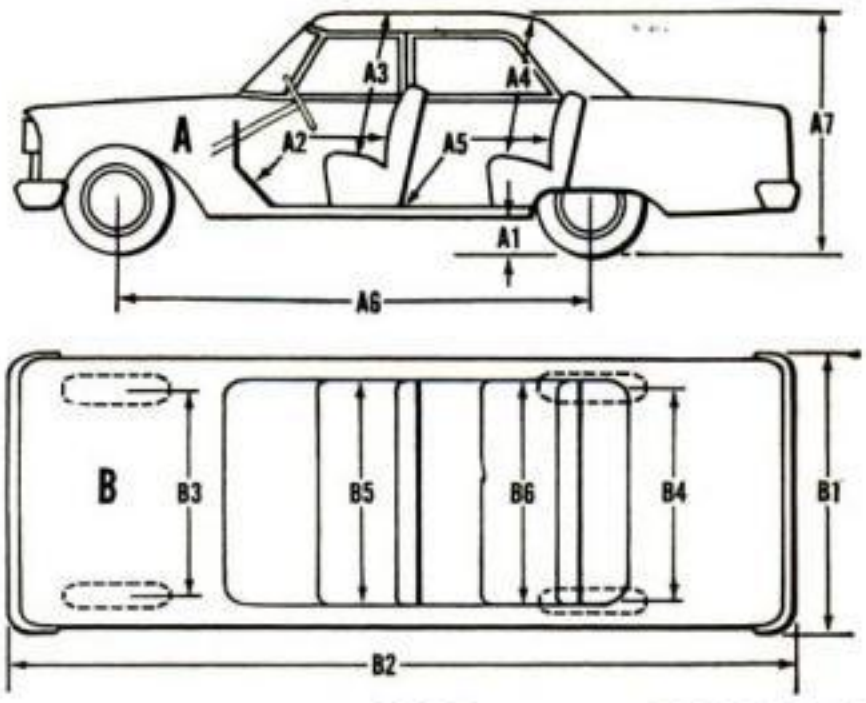
brakes faded to a point where no amount of pedal pressure (with power assist) could stop it in a reasonable distance. The Ford brakes were not fade-free, but they never gave out completely even when they overheated, and recovery was quick. Neither car had perfectly even brakes—once in a while they would pull hard to one side. Brakes are the weak spot in both, but it's not so serious for the Ford as for the Plymouth.

Around the bend. Both the Fairlane and the Satellite are soft-riding and often feel like full-size cars. The Fairlane suspension systems are built on the same principles as the old Fairlane—drag struts and transverse arms in front and semi-elliptic leaf springs at rear—but the track is wider, the springs are softer, and roll stiffness is higher. Plymouth's Satellite has the usual Chrysler Corp. torsion-bar front suspension, and semi-elliptic leaf springs carry the rear axle. The standard Satellite suspension makes the car slew if you're hard on the throttle. Much firmer springs and a rear stabilizer ought to correct this. I feel that the heavy-duty (Rally) suspension would be preferable even with a six—but it's a must with the V-8.

When the Satellite is driven more conservatively (say within the capabilities of the 200-hp. Fairlane), the suspension is adequate. The Satellite has better shock damping and better pitch control than the Fairlane, but the Ford's wheel movements are better directed. The Satellite, like the full-size Fury, has a problem with rear-wheel stability due to the springs flexing under body roll. On hard turns, the car ends up in an oversteering attitude (despite initial understeer). The Fairlane has no problem with roll oversteer, even if it leans over more than the Satellite does under a given side force.

Up the straight. Directional stability is

[*Continued on page 196*]



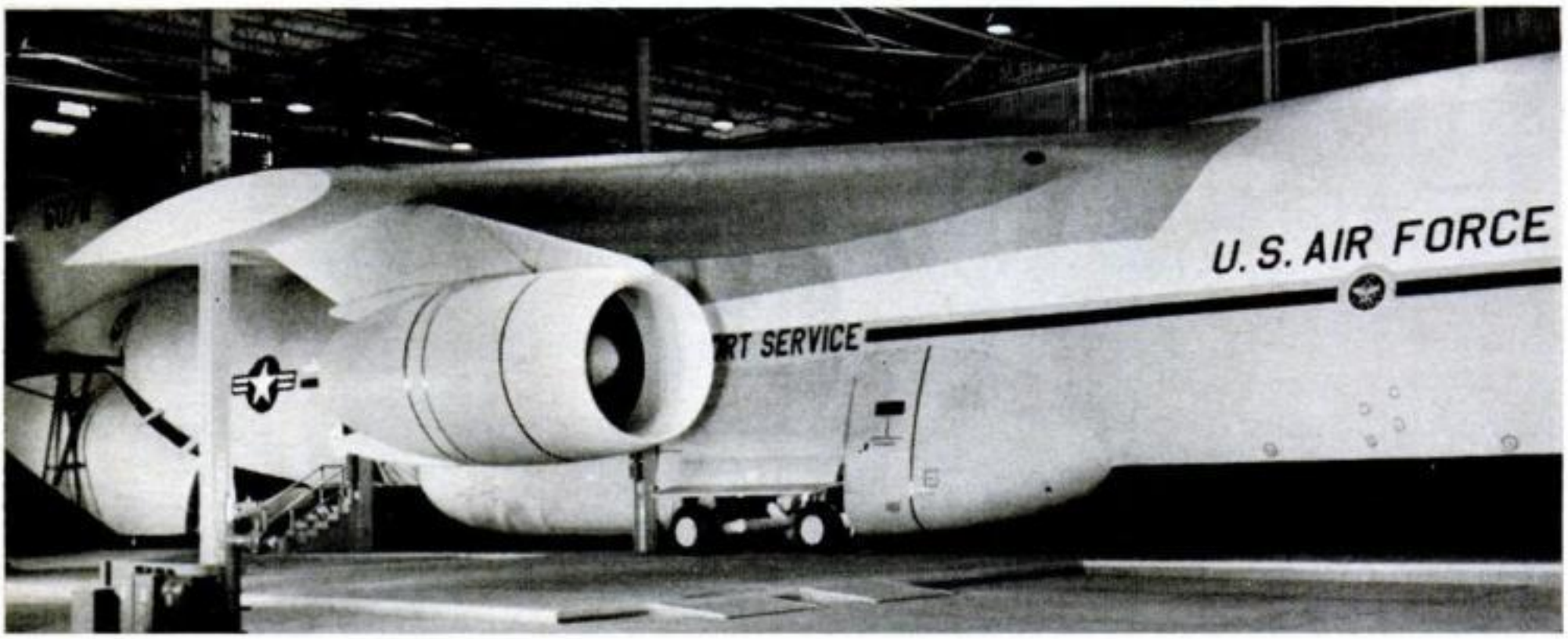
	FORD Fairlane 500	PLYMOUTH Belvedere Satellite
DIMENSIONS (inches)		
A1 Ground clearance	8.0	8.0
A2 Front leg room	42.1	41.6
A3 Front head room	38.0	37.8
A4 Rear head room	36.8	37.1
A5 Rear leg room	33.9	34.3
A6 Wheelbase	116.0	116.0
A7 Overall height	54.3	53.2
B1 Overall width	74.0	76.5
B2 Overall length	197.0	200.5
B3 Front track	58.2	59.5
B4 Rear track	58.2	58.5
B5 Front-seat width	52.5	22 (2)
B6 Rear-seat width	57.75	57.5
SPECIFICATIONS		
Engine type	OHV V-8	OHV V-8
Bore & stroke	4.00 x 2.87	4.25 x 3.38
Displacement	289 cu. in.	383 cu. in.
Compression ratio	9.3:1	10.0:1
Carburetion	Single 2-bbl.	Single 4-bbl.
Power @ r.p.m.	200 @ 4,400	325 @ 4,800
Torque @ r.p.m.	282 @ 2,400	425 @ 2,800
Transmission	Ford-O-Matic 3-speed planetary and torque converter	4-speed manual floorshift
Axle ratio	2.80:1	3.23:1
Tire size	6.95x14	7.35x14
Steering ratio	21.6:1	19.0:1
Turns, lock to lock	3.75	3.5
Turn radius	20.75 ft.	20.3 ft.
Brake-swept area	289.6 sq. in.	314.2 sq. in.
Curb weight	3,155 lb.	3,410 lb.
Price as tested	$2,947.29	$3,680.70
PERFORMANCE		
0-60 m.p.h.	11.2 sec.	7.9 sec.
0-80 m.p.h.	20.6	14.2
40-60 m.p.h.	5.2	3.5
50-70 m.p.h.	7.0	5.0
SS ¼-mile	18.8	16.8
Fuel mileage	17.3 m.p.g.	15.1 m.p.g.

Ford trunk, partly obstructed by spare wheel, has useful space of 15.2 cu. ft. Lid is 54 inches wide.

Plymouth trunk, with tank and spare under floor, has 16.8 cu. ft. useful space. Lid is 53 inches wide.

Urheberrechtlich geschütztes Material

Huge Soviet AN-22, built to carry 720 passengers or 88 tons of freight, has enough



Mock-up of even bigger U.S. C-5A (airlift for up to 700 combat troops or 125 tons of

U.S. and Russia vie for biggest planes

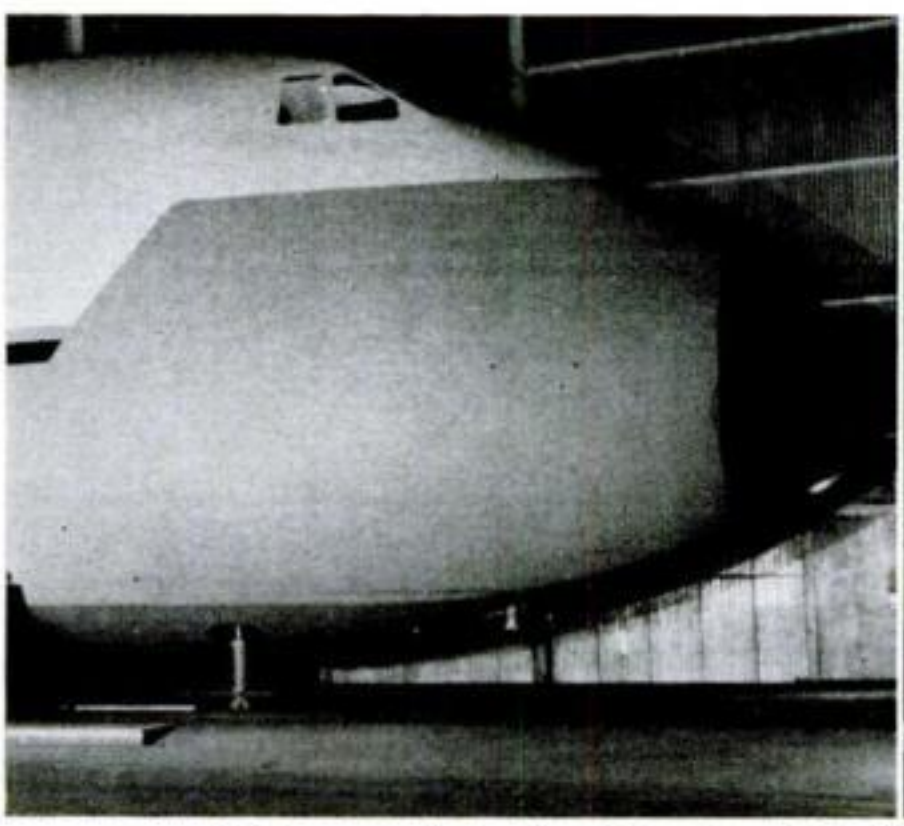
Russia's immense AN-22 is already flying, and an even bigger U.S. C-5A is scheduled by the Air Force to take to the air by 1968. The AN-22, shown at the Paris Air Show, is powered by four 15,000-hp. turboprop engines, cruises at 420 m.p.h., and can carry, the Russians claim, 720 passengers or 88 tons of cargo. The C-5A will be faster. With four jets it will do 550 m.p.h.,

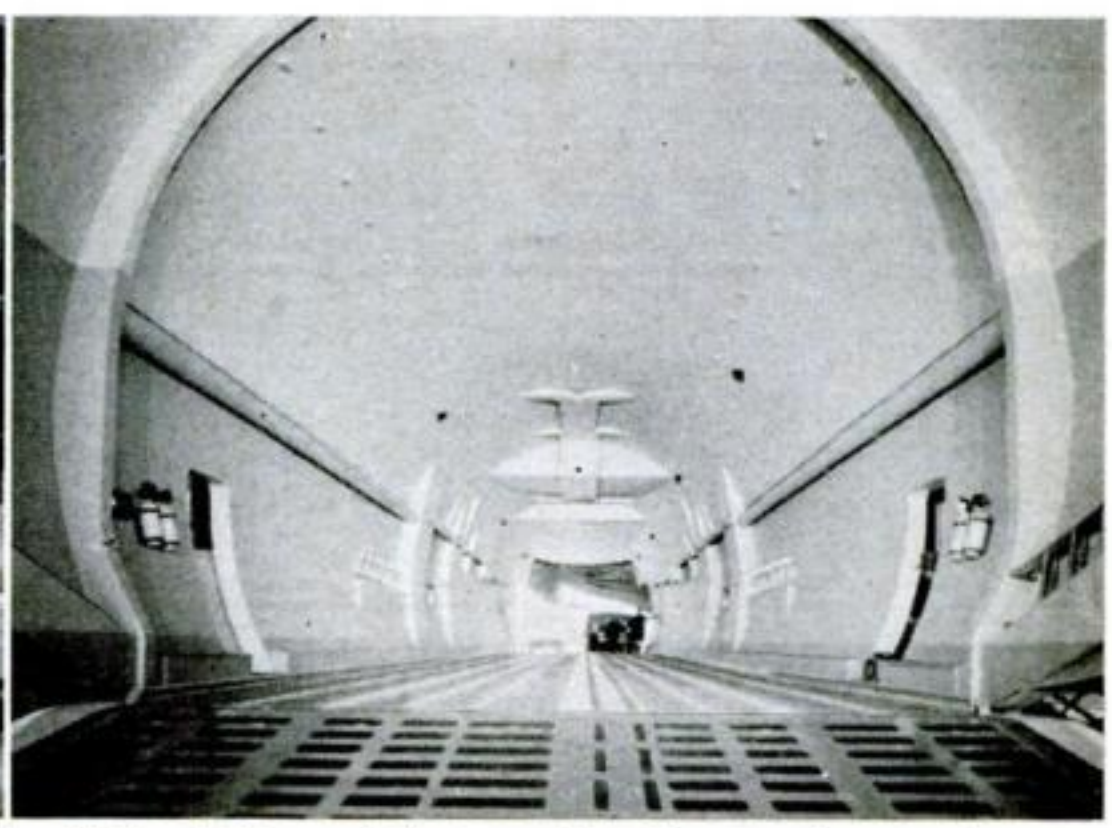
Razor uses steel-ribbon blade

Turn a lever in the handle of the new Gillette Techmatic razor (left), and a 12-inch ribbon of stainless steel, coiled in a cartridge, moves to advance a fresh shaving edge into place, wind the old one back. The cartridge snaps into the razor, has a dial that tells how many shaving edges are left (there are six, in all). Cost: $2.95 for razor with cartridge, $1 for replacement cartridge.

Urheberrechtlich geschütztes Material

room in big cargo compartment (above) for an interurban bus to be driven in or out.





cargo) has an interior like New York's Holland Tunnel that could take two buses abreast.

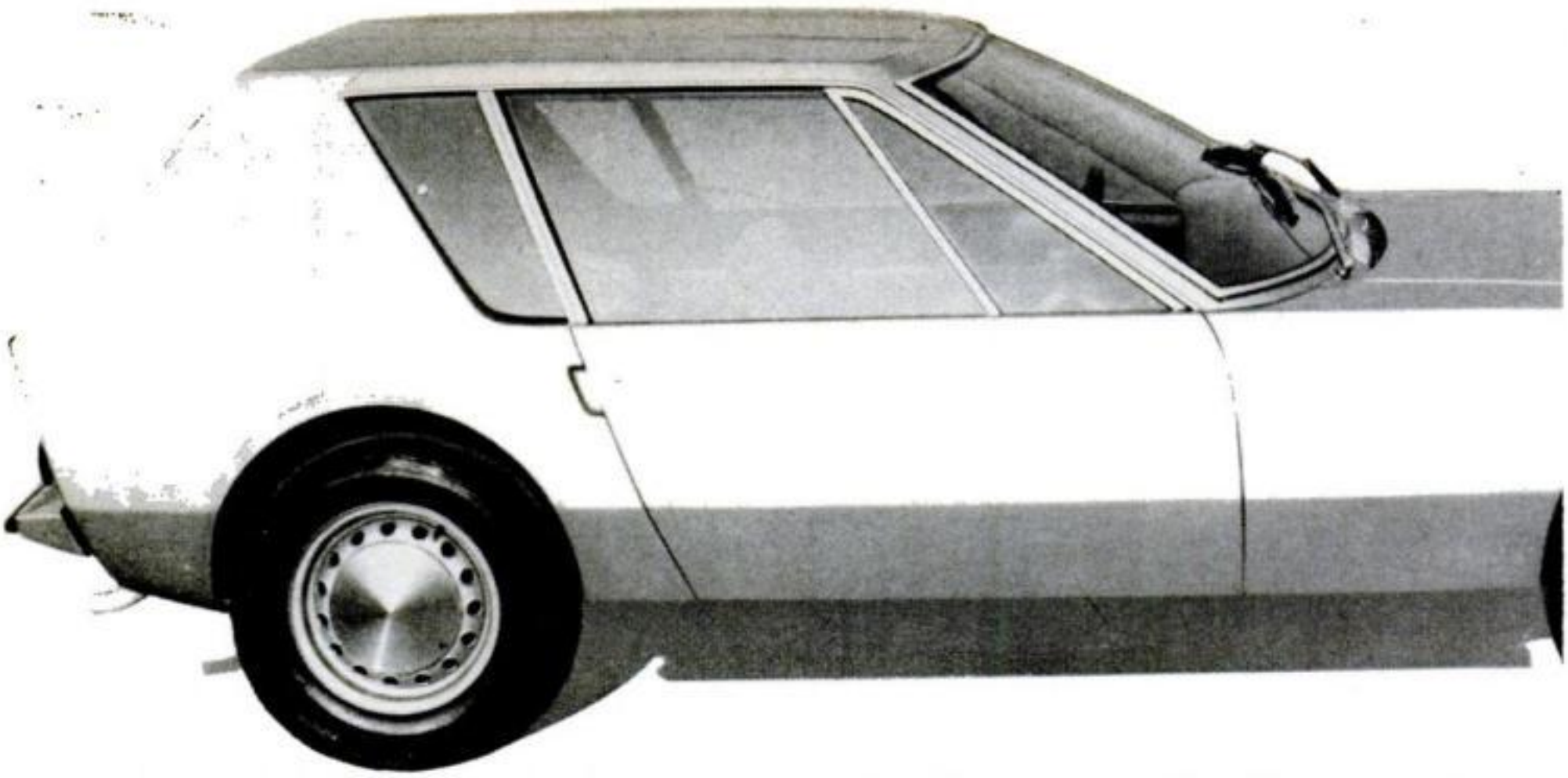
transport up to 800 passengers, 700 combat-equipped troops, or 125 tons of cargo.

The AN-22 is 187 feet long and has a wingspan of 211 feet. The C-5A will be 230 feet or more long, twice the size of a Boeing 707, Douglas DC-8, or Lockheed C-141 StarLifter, and have a wingspan of 222 feet. The vast interior is big enough to accommodate two lines of trucks with a sidewalk between and on both sides. Passengers are seated on double decks in both planes shown. Lockheed will build 58 C-5As at a total cost of $2 billion.

Boat is powered by sun's rays

Two banks of solar cells converting energy from the sun into electricity propel the canvas-canopied rowboat-size craft at right. Built by John Hoke, Alexandria, Va., for the Agency for International Development, it may be sent to underdeveloped tropical nations where fuel is scarce but sunshine plentiful. Tests by the Army found use of solar cells feasible for lightweight boats.

Urheberrechtlich geschütztes Material



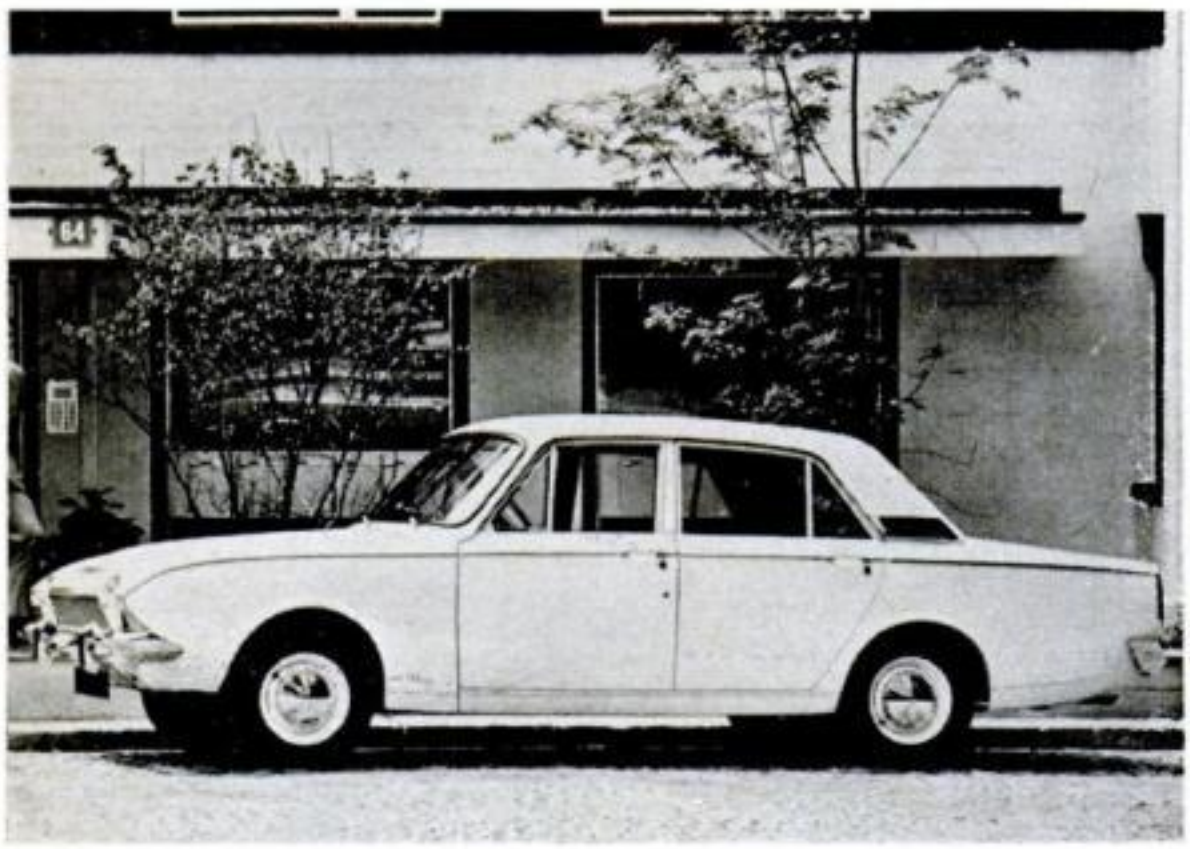
With small four-cylinder engine of only 60 hp., low-drag NSU Autonova GT prototype claims a

First of Europe's '66 Cars

The annual-model-change fever is not yet epidemic in the European auto business, but *all-new* cars appear with increasing frequency. Here are some new models of great engineering interest:

● A front-drive Auto Union 1700 Audi with a baby-Mercedes engine. An unusual combustion chamber allows an 11.2:1 compression ratio. Pistons are double-crowned, with an annular face ringing a circular depression. Contoured intake ports provide a high degree of swirl for exceptionally good filling. The piston face assures absence of end gas after the power stroke (major cause of detonation).

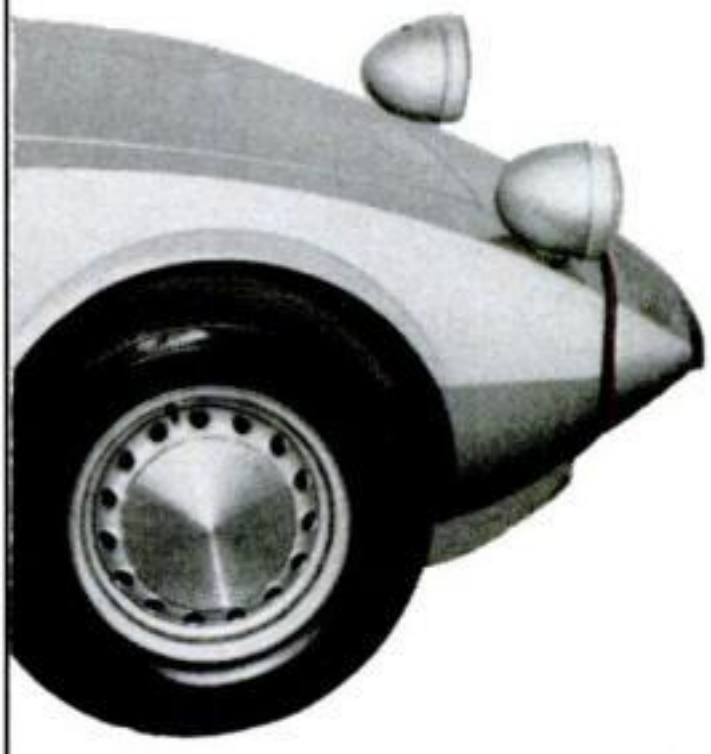
● A new V-4 engine from Ford of England, available in both Cortina and Corsair models. Cylinders are staggered in two banks angled at 60 degrees, giving a block length of only 20 inches. Pistons have bowl-in-crown (Rover-type) combustion chambers for precise uniformity in



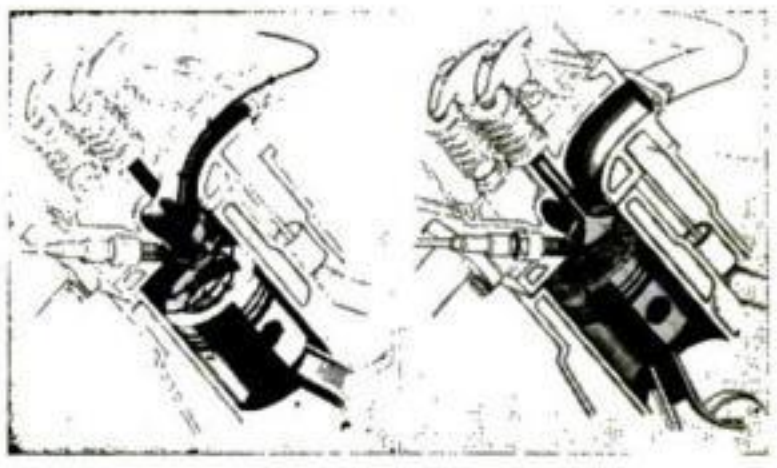
Latest Ford Corsair packs brand-new V-4 engine of advanced design.

Bores are staggered in Ford's new V-4 to give extremely compact dimensions. Ultra-short stroke cuts friction losses, piston speed, and engine wear.

Urheberrechtlich geschütztes Material



top speed of some 110 m.p.h.



New Audi has its combustion chambers in the piston crowns and a flat cylinder head. Engine was developed by Mercedes-Benz, joint owners with Volkswagen of DKW and Audi. New Audi has front-wheel drive; its OHV engine develops 72 hp. at 5,000 r.p.m.

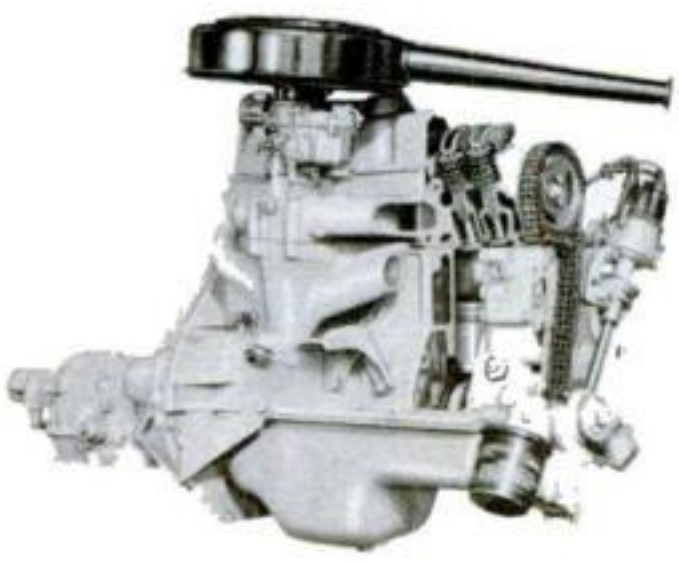
clearance volume for this British engine.

● An overhead-cam engine for the Opel Rekord. The chain-driven shaft lies next to the valves, not in the usual top-side position, and actuates them through short, hollow tappets and rocker arms.

● An aerodynamic NSU prototype built in collaboration with Autonova (a small group of German and Italian industrial designers). The NSU Autonova GT will reach a speed of 110 m.p.h. with only 60 hp. The NSU single-OHC four is located in its usual position—in the tail. The fiberglass bumpers are isolated by rubber linings, and the rocker panels are also made of fiberglass to guard against corrosion.

● A prototype NSU-Wankel engine with twin rotors, intended for an all-new medium-size NSU car. This engine can be regarded as a Siamese-twin version of the single-rotor unit used in the Spyder, and will have a power output of about 125 hp.

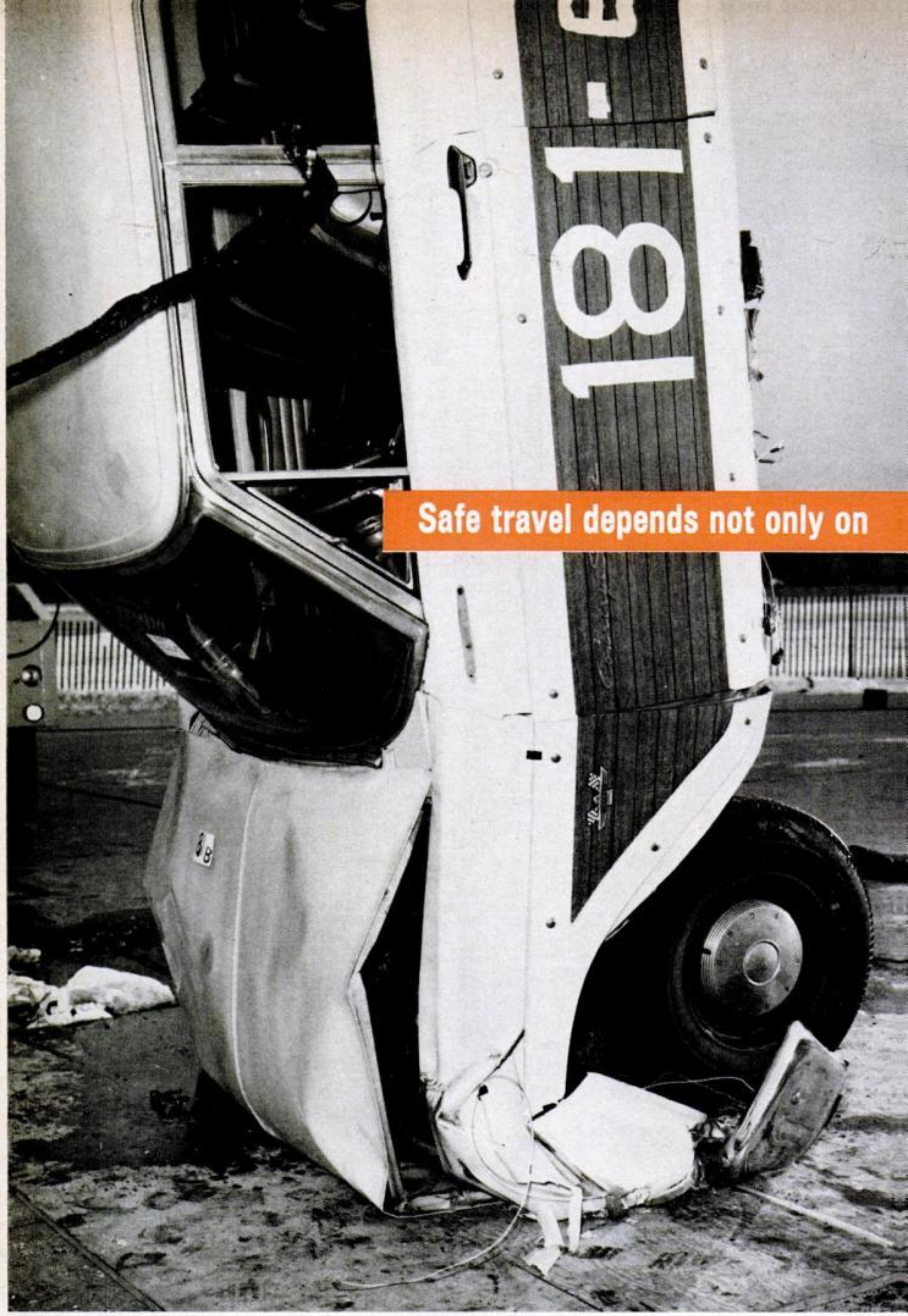
Other new models recently announced include a front-drive Triumph 1300, an all-new Rolls-Royce with unit-construction body and all-independent suspension, and the Chrysler-powered four-wheel-drive Jensen-Ferguson passenger car. A full account of these and other new European cars will appear soon in POPULAR SCIENCE.



Rectangular-eyed Opel Rekord gets first crack at the single-OHC engine shown at left. It comes in three sizes: 1.5, 1.7, and 1.9 liters.

Rolls-Royce Silver Shadow replaces famous Silver Cloud. New Rolls has unit body, independent suspension, disk brakes. Cost in U.S.: about $20,000.

Urheberrechtlich geschütztes Material



Ford Motor "drop-tests" a car front-end-down to get answers on safer designs for passengers.

Urheberrechtlich geschütztes Material

Henry Ford II Talks About Car Safety

car design but on driver skill, highways, law enforcement

By Henry Ford II / *Chairman of the Board, Ford Motor Company*

Safety has been an essential goal of automotive design since the beginnings of our industry. The basic function of the automobile has never been more clearly expressed than in the slogan of the Model T—"It takes you there and it brings you back." That slogan also underlines the first criterion of successful automobile design—the ability to carry the traveler to his destination and back without mishap.

Safe highway travel depends not only on the design of the car, but also on the skill of the driver, the quality of the highways, and the adequacy of law enforcement. Over the years, the United States has made steady progress in each of these four areas, and, as a result, the odds in favor of getting there and back safely have improved tremendously. Today, the American people travel by automobile much more frequently, much further, and much more securely than any other people in the world.

The U.S. fatality rate per 100 million motor vehicle miles has been cut by one-half in the past 20 years, by two-thirds in the past 30 years, and by

Continued

New multimillion-dollar building in sketch will house company's Automotive Safety Center.

Urheberrechtlich geschütztes Material

"A highway fatality occurs once in about 16 million miles of vehicle travel, once in about three million person-trips, once in about 2,000 years of automobile travel by the average person."

four-fifths in the past 40 years. A highway fatality occurs once in about 16 million miles of vehicle travel, once in about three million person-trips, once in about 2,000 years of car travel by the average person.

In citing this record of past progress, I do not mean to imply that we can be complacent about the future. On the contrary, during the past few years progress toward safer highway travel has come to a halt, and the highway-fatality rate has begun to edge back up. With rapid increases in the number of young drivers and the number of cars, fatalities have been rising sharply, and so has the economic cost of accidents.

I believe that we can and must resume our national progress toward safer highway travel. The opportunities are as great as the need. To see what these opportunities are, it may be helpful to review each of the four basic elements in highway safety—the driver, the regulation of auto use, the highway, and the car.

Safety and the driver

By and large, the American driver does an excellent job. On the average, he drives for four years between accidents, and 44 years before he is injured in an accident. His success in avoiding accidents is probably one of the main reasons why he does not do many of the things he could do to make his driving still safer.

The National Safety Council has estimated, for example, that universal use of seat belts would save 5,000 lives a year. Yet, according to a recent Gallup poll, only 36 percent of the motorists whose cars have seat belts use them every time they drive.

High-school driver-education courses have demonstrated their ability to produce the skills and attitudes necessary for safer driving. Yet fewer than half of our eligible high-school students enroll in courses meeting generally accepted standards. In view of the rapid growth in the number of young drivers and their high accident rates, it is imperative that these courses be made available to all young people.

Safety and law enforcement

No state has a really adequate licensing system for making sure that incompetent or habitually reckless drivers are barred from the road. Licensing requirements are virtually nonexistent in some states and seriously inadequate in most. No state requires periodic re-examination of all licensed drivers to detect physical impairment or other conditions that affect driving ability. Stricter licensing also would serve the very valuable purpose of upgrading the training programs for new drivers.

It makes little sense to require that new vehicles meet safety standards without also requiring that owners maintain vehicles and equipment in safe working order. Today's new cars will stand a great deal of neglect; with normal maintenance they will perform safely for well over 100,000 miles. However, any car will deteriorate dangerously with prolonged neglect. All states require that cars be maintained in safe condition, but 30 states, with two-thirds of the nation's vehicles, make no provision for periodic inspection to enforce this rule.

Safety and highway design

As a nation, we have only begun to tap the safety potential of highway design. It has been estimated that the 41,000-mile interstate highway system will save 8,000 lives a year when completed. Unfortunately, construction of the interstate system is behind schedule, especially in urban areas, where the need is greatest. A great many lives can also be saved through systematic "spot improvements" at especially hazardous locations on older roads.

The automobile industry has maintained an active interest in each of these three areas—the driver, the regulation of car use, and the highway system. Ford has had a program for many years under which our dealers provide cars to driver-education programs at no cost to the schools. We conduct research on the driving task and its relation to car design. We have a vigorous legislative program at the state level in support of driver education, improved regulation, and better highways.

Safety and automobile design

Our primary responsibility, however, is

Urheberrecht ch geschütztes Material

to design and build safer cars. Safety in car design involves two main goals. The first, and most basic, is accident prevention. The second is reducing injuries when accidents do occur.

Many features of car design obviously contribute to accident prevention. These include such things as better lights, better brakes, improved signaling devices, and improved vision. Many other features are equally important, though not so obviously connected with safety—better handling qualities for easier and more precise control, better riding qualities and greater silence for reduced driver fatigue, better acceleration for avoiding potentially hazardous situations, better tire design for more skid resistance, lower center of gravity for greater stability and resistance to roll-over.

The maintenance-free reliability and durability of today's automobile—reflected in extended warranty periods and longer lubrication intervals—are additional safety factors. They increase the safe-driving life of the car in spite of owner neglect.

Improvements such as this cannot be added to a car. They are an inseparable part of its total design. They account for the greatest part of our research, engineering, and testing effort, and they represent our most important contribution to safety.

Although our main concern is to prevent accidents, Ford was the first automobile company to undertake systematic research to design cars so as to reduce injuries when an accident does occur. The result of this pioneering research was the industry's first "safety package," introduced 10 years ago, and consisting of seat belts, padded instrument panels and visors, stronger door latches, energy-absorbing steering wheels, shatter-resistant rearview mirror, and stronger and more securely fastened seats.

Since that time, we have greatly improved the injury-reducing features of Ford cars. For example, today's instrument-panel padding is capable of absorbing twice as much energy as the padding we first used. We have improved our safety door latches several times, and more than doubled their resistance to opening under strain.

The work of improving present safety devices and designing new ones is concentrated at our Automotive Safety Center in Dearborn—first of its kind in the industry. This center systematically gathers and interprets data pointing to needed design improvements, creates new designs, and subjects them to the rigorous testing that is necessary before they can be marketed.

Among the improvements now available on our 1966 cars are new, thicker-laminate windshields which greatly reduce the hazards of head injuries, and a safety seat for small children offered by Ford and Lincoln-Mercury dealers.

As I have indicated, there is still ample room for progress in each of the four major elements of traffic safety. However, we will miss the chance to make still faster progress if we continue to think about each of the four elements separately. The challenge we face today is to develop a complete highway transportation system that is efficient and safe because the controls, the car, and the road are all designed to fit each other and all of them together are designed to fit the driver.

"These are the reasons why we support suggestions such as that by Senator Abraham Ribicoff for the establishment of a National Highway Safety Research Center in the Department of Commerce."

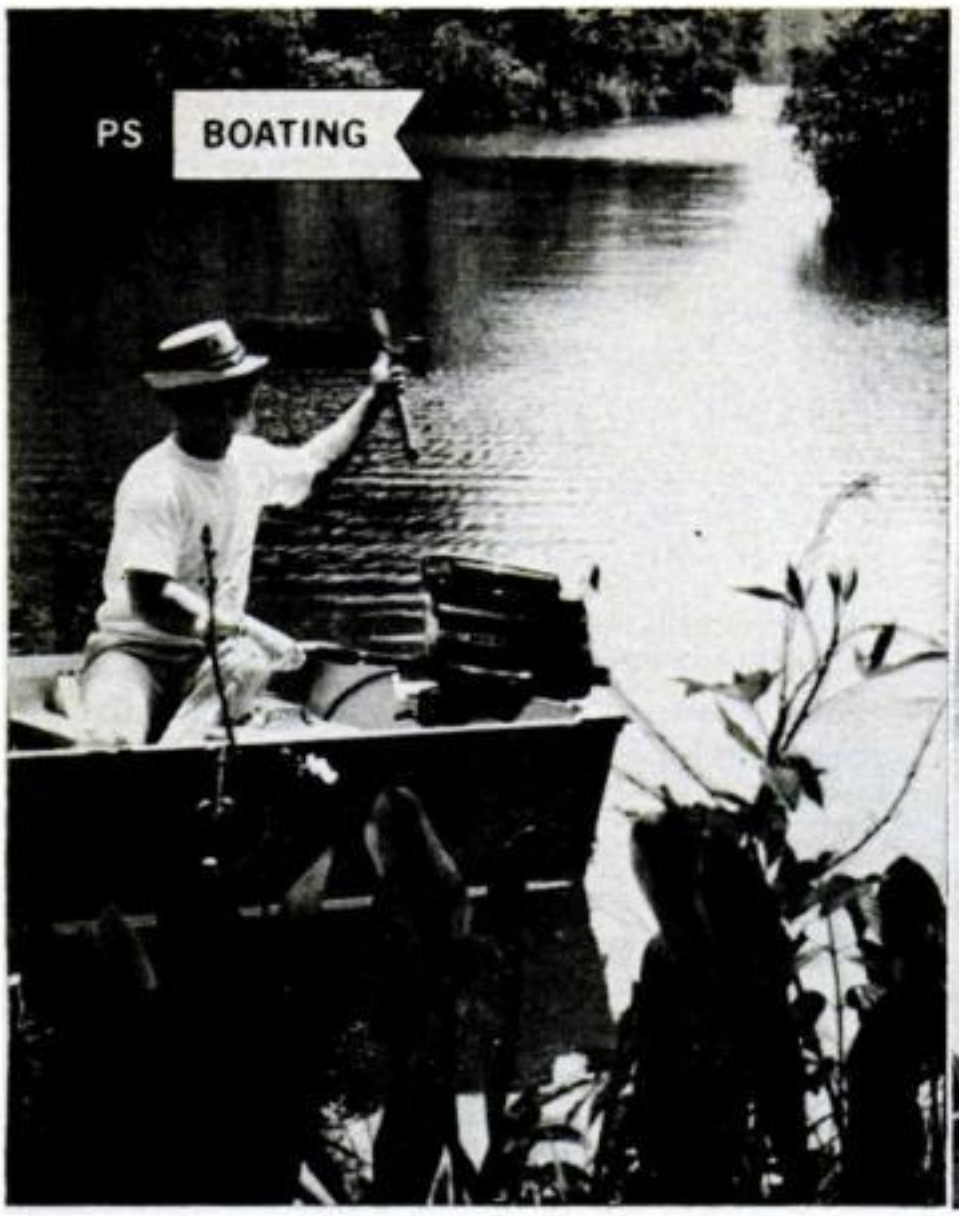
Developments flowing from technological advances in electronics and computer applications promise more effective methods of controlling traffic flow and informing the driver about the traffic environment.

A television surveillance system on one of our Detroit freeways, for example, has increased rush-hour capacity by 30 percent. Automatic controls which adjust traffic-light intervals to changing traffic conditions are now being installed in New York City and in several other cities. By producing a smoother and faster flow of traffic, such devices reduce the congestion and traffic friction which leads to accidents.

Ford's Radio Road Alert System demonstrates another form of electronic aid to the driver. At present, the driver relies on his eyes almost exclusively for the information he needs to reach his destination and to avoid dangerous traffic situations. In areas of high accident potential, the driver's capacity to observe and interpret road signs and signals and traffic patterns may be

[Continued on page 190]

Urheberrechtlich geschütztes Material



Because they live hard, an outboard's plugs are apt to foul under trolling speeds, cause pre-ignition at high speeds, and must be designed to resist both.

Surface-gap plug is used in big McCulloch motor. These new plugs can't be used indiscriminately in two-cycle engines, but must be mated to ignition.

The Inside Story: OUTBOARD

These simple-appearing critters lead a hard, complex life. Here's how to keep 'em happy

By JIM ROE / *PS Boating Editor*

Call any man a "spark plug," and he glows with pleasure. It means that he fires up the people around him to get things done.

The little half-a-handful of metal and ceramics that built up this big character recommendation plays an equally important role in *its* work. For it's the spark plug that transforms an assemblage of a few hundred parts of cold metal into a go-go motor.

The spark plug's function sounds deceptively simple: It must ignite the fuel charge in an engine's combustion chamber. But as it does this, it is exposed to greater stress than any other part of a marine engine—outboard or inboard.

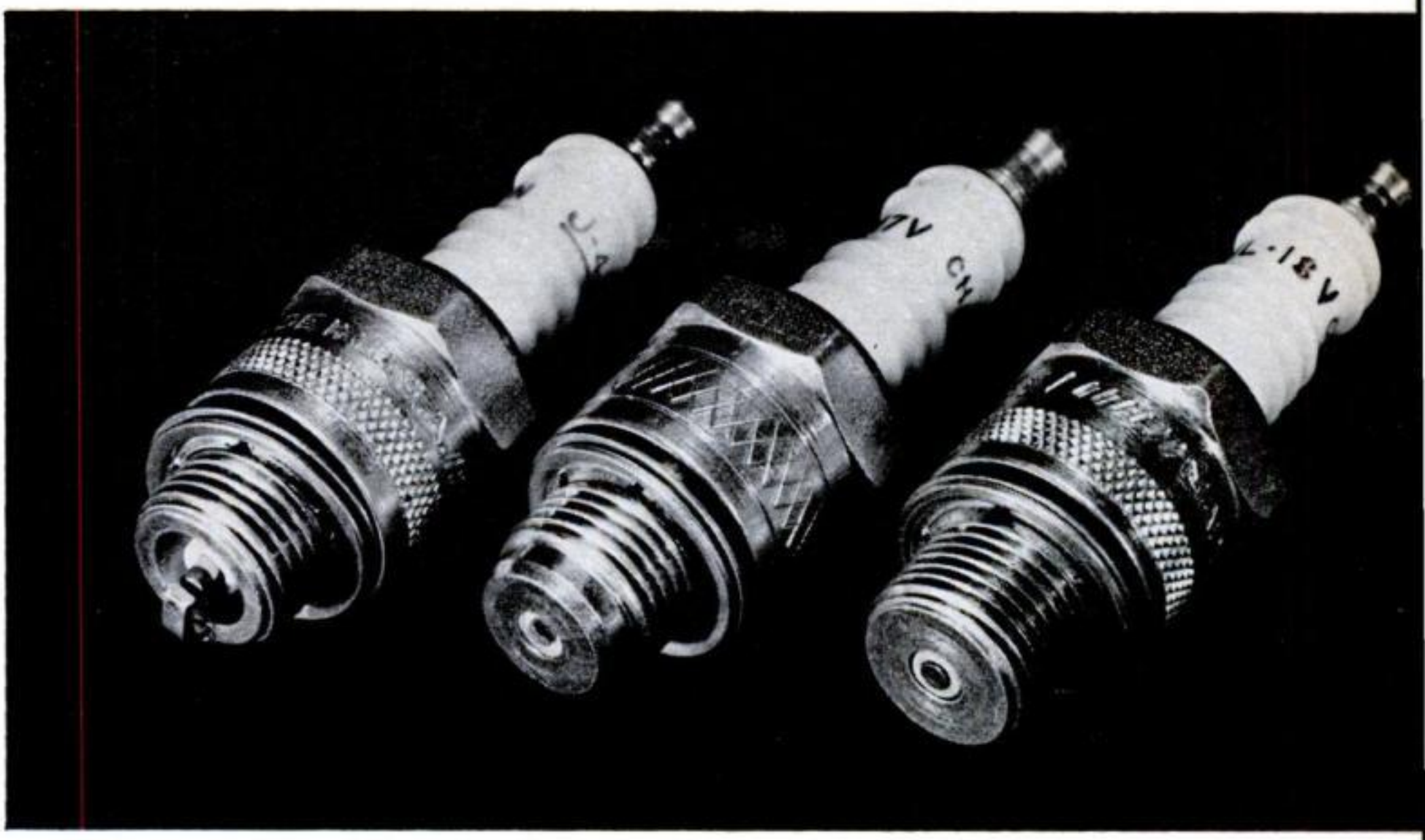
Small plug in a big job. A spark plug must insulate the passage of thousands of volts of electricity into the combustion chamber. Yet its terminal end may be ice cold while its firing tip, only three inches away, is exposed to flame temperatures in excess of 4,000 degrees F. The plug also has to seal off the hammerlike blows of combustion pressures, while it maintains an even flow of heat from its firing end to avoid pre-ignition.

Heat is the basis of an internal-combustion engine. It causes the expansion that pushes on the piston. Without heat there would be no power. The more heat, the more power. And a spark plug's insulator tip must be able to withstand this heat. It must maintain an even flow of heat from its firing end to avoid becoming a source of pre-ignition.

Pre-ignition occurs whenever anything in

Continued

Urheberrechtlich geschütztes Material



Three types of plugs include conventional one at left, showing familiar extending electrode. Center plug is Champion's UJ-17V surface-gap plug. At right is Kiekhaefer's brand-new Polar-Gap plug. It's 800 to 1,000 degrees cooler in operation than conventional plugs, and is said to be virtually self-cleaning.

SPARK PLUGS

PLUG PROBLEMS: THEIR CAUSE AND CURE

Normal—plugs have deposits of light tan or gray. Electrodes are not burned, gap growth is small. Can be cleaned and re-installed.

Wet fouling—wet or damp black carbon-oil film. Causes: prolonged trolling, too-rich low-speed carb adjustment, bad fuel/oil ratio.

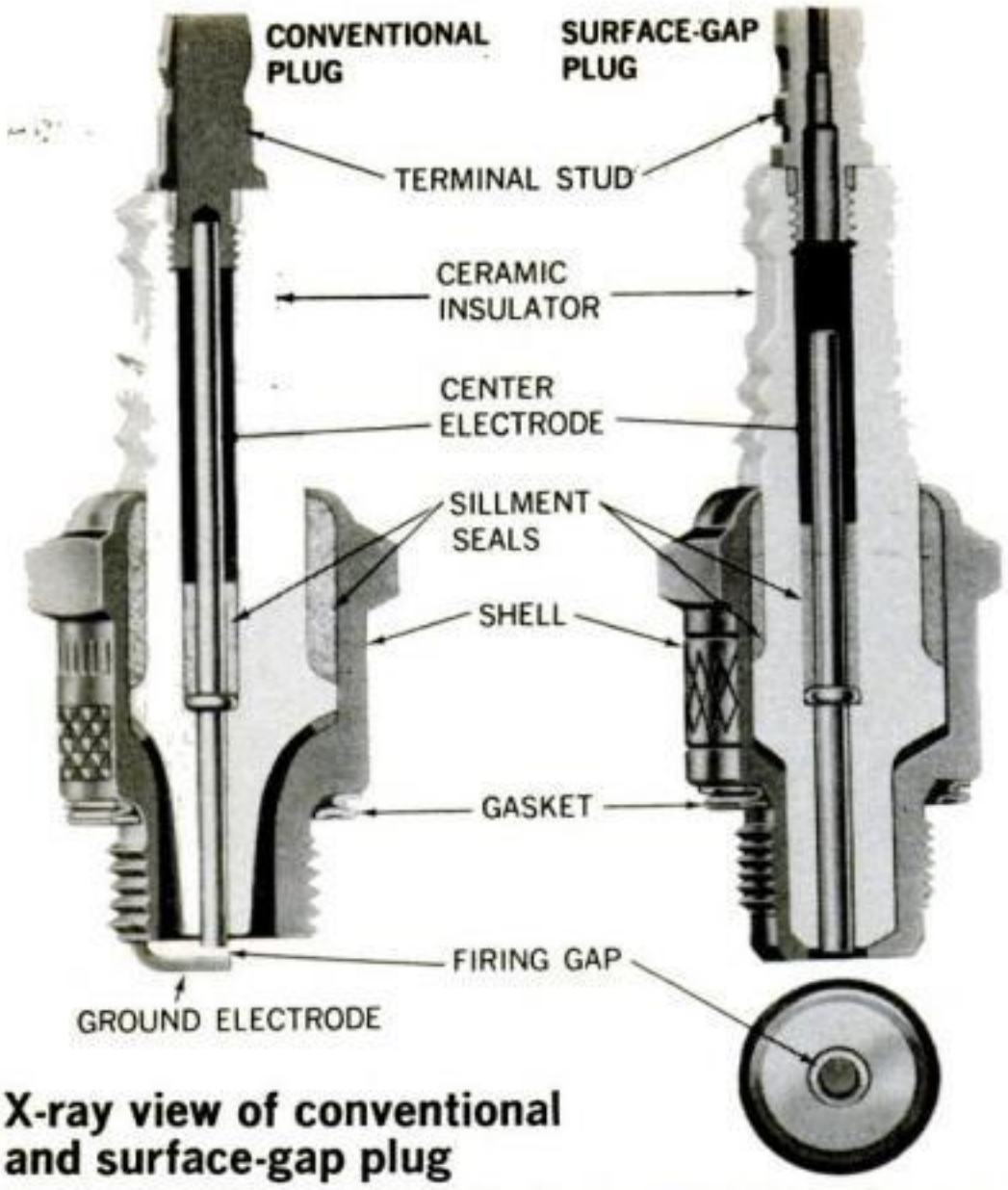
Core bridging—result of deposits accumulating inside engine during prolonged trolling. High-speed run loosens goop from piston tops.

Gap bridging—also due to flying deposits within combustion chamber. Here, deposit has lodged between electrodes, shorting plug.

Aluminum throw-off (rare)—happens when pre-ignition occurs in engines with aluminum-alloy pistons. Plug is now useless.

Overheating — overheated plugs have dead-white or gray insulators, which also have a blistered appearance. Gap wear is excessive.

Urheberrechtlich geschütztes Material



X-ray view of conventional and surface-gap plug

Note basic difference of the business end of the surface-gap plug at right, when compared with conventional plug (left). Surface-gap plug shown is Champion's UJ-17V used in McCulloch outboards. Insulator is seated almost flush with the firing end of the plug. Plug runs comparatively cool during high-speed operation; combustion deposits do not cling.

the combustion chamber gets hot enough to ignite the fuel charge before the normal ignition spark. At the same time, the spark plug must run *hot* enough to burn off combustion deposits that might short-circuit the high voltage, and thus make the engine misfire.

Though all spark plugs are tough and many-talented, they are by no means all alike. Most of us know of the effect that different-size gaps have on the spark. But as a rule we are less aware that spark plugs are built in various "heat ranges" for varying kinds of engine operation. The difference between a "hot" and a "cold" plug is the difference in temperatures at which each will operate inside the combustion chamber.

"Heat range" refers to the classification of spark plugs based on their ability to transfer heat from the firing tip of the insulator to the engine's cooling system.

If the plugs run too hot, the electrodes will wear rapidly and, under extreme conditions, may pre-ignite the fuel mixture. If the plugs run too cool, oil, carbon, and lead compounds deposit on the insulator tip and cause fouling and a missing engine.

Plugs chosen for "average" operating conditions may not operate well at sustained high speeds, with abnormally heavy loads, or under continuous *low-speed* operation. Normal or average engine service is assumed to be a mixture of idling, slow-speed, and high-speed running. Occasional or intermittent high-speed operation is essential to provide increased combustion heat to burn away excess deposits of carbon or oxides that may have accumulated on the plug from frequent idling or low-speed operation.

Because dissipation of heat is so important in spark-plug design, there is great interest in a new type: the surface-gap spark plug. Surface-gap spark plugs are particularly efficient in dissipating heat rapidly. Their design is quite different. In a conventional plug, the spark jumps an air gap between two electrodes. In a surface-gap plug, the spark travels either on the surface of the insulator or through a semiconductive material on the surface of the insulator. There is no electrode sticking out.

Why the "new look"? The surface gap provides for maximum heat transfer from the center electrode, to the spark plug, to the outer shell—particularly in the area of the core nose. The actual firing gap is in a ring, and the spark discharge from the center electrode to the ring is across the exposed surface of the insulator. Thus—"surface gap."

This design reduces the surface exposed for accumulating deposits. No recess exists within the spark plug behind the firing gap. Hence, greater insulation is achieved between center electrode and outer shell. Early measurements of core-nose temperature showed surface-gap plugs would run about 700 degrees cooler than conventional plugs.

An improved spark plug of completely new design is Kiekhaefer's Polar-Gap. This plug is used in their Merc six-cylinder top-horsepower outboard motors for 1966.

Performance and fuel-economy tests have shown that the new design allows increased power output with reduced fuel consump-

Urheberrechtlich geschütztes Material

tion. It also has more than doubled service life—even with automotive-type leaded gas.

During World War II Kiekhaefer engineers developed a capacitance-gap ignition system that fired spark plugs with ring-shaped surface-gap electrodes. In combination with a special ignition system, these plugs maintained ignition under deposit conditions intolerable to conventional plugs.

The Polar-Gap plugs now are said to operate reliably with the standard coil-and-battery ignition of Mercury six-in-line engines. The engineers say the plugs have all but eliminated pre-ignition and fouling problems. They operate from 800 to 1,000 degrees cooler than conventional plugs and are virtually self-cleaning because deposits are blasted off the smooth, flat firing end as the engine runs. The electrode gap never requires adjustment. All this and a reported six-percent reduction in fuel consumption to boot!

Checking them out. Just looking at the points of a spark plug will often tell you what is wrong somewhere else in the engine. Here are some of the things to check:

Normal. Under normal operation there are brown to grayish-tan deposits and slight electrode wear. A plug showing these chracteristics may be cleaned, regapped, and re-installed.

Oil fouling. Wet, oily deposits with only minor electrode wear may be caused by oil being pumped past worn piston rings, or by excessive valve-stem-guide clearances. A spark plug with higher heat range will tend to reduce these oil deposits, but too hot a plug will cause pre-ignition.

Gap bridging. Here the spark gap is shorted out by particles getting wedged or fused between the electrodes. They originate from the piston, and are caused either by excessive carbon in the cylinder, use of nonrecommended oils, or immediate high-speed operation of the outboard motor after prolonged and excessive trolling. Another cause: improper fuel-mix ratio.

Aluminum "throw-off." A metallic gob of gray pot metal adheres to the electrodes and the plug bore. This is very rare, but is caused by pre-ignition within the cylinder melting aluminum alloy off the piston.

Wet fouling. Damp or wet black carbon can be seen coating the entire firing end. It's caused by one or more of the following: a wrong spark-plug heat range (too cold); prolonged trolling operation; the low-speed carburetor adjustment is too rich; improper ratio of fuel mix; defective breaker points causing voltage lack.

Twenty years of progress in surface-gap development: early surface-gap plug (top) developed by Kiekhaefer during World War II; a more advanced design of the 1950s (center); and the new Polar-Gap plug for Mercury's 95-hp. Merc 950 and 110-hp. Merc 1100. New plug runs cooler, lasts longer.

Overheating. Overheated, electrodes become badly eroded. Plug shows premature gap wear and the insulator has a gray or white "blistered" appearance. Some possible causes: incorrect spark-plug heat range (too hot); carburetion too lean; ignition timing overadvanced; sticky piston rings; prop not suited to the boat, or the load, or the motor, so that engine lugs; worn or defective water pump; salt, scale, or mud in the water jackets causing a restriction in the cooling system.

Core bridging. The bottom or side electrode is usually coated with an ashlike deposit. The insulator nose is possibly peppered with tiny beads or small chunks fused to the firing end. For the cause here, check the culprits of gap bridging. PS

Urheberrechtlich geschütztes Material

How to Buy a COLOR TV Set

Why be up in the air over color TV? Here are the down-to-earth facts

By RONALD M. BENREY
Electronics Editor

Grass is green and faces are flesh tone—that's the way you see them in real life, and that's the way they look on any of the spanking-new 1966 color TV sets.

Without a doubt, the color TV set has finally come of age—the amazing boom in color-set sales proves the point. Over half

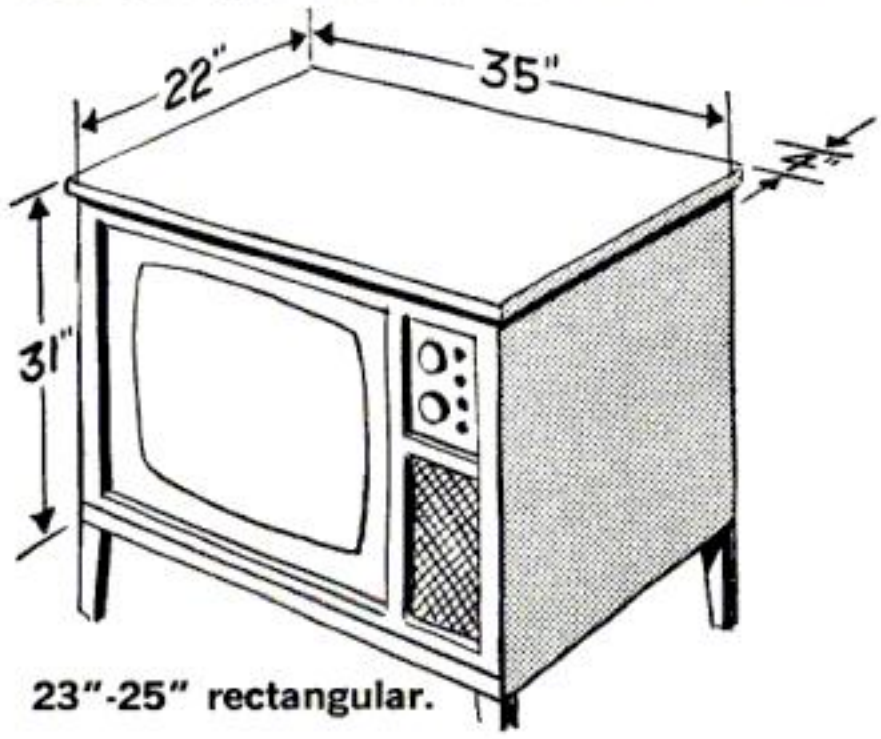
Continued

Popular Science

MANUFACTURER	CHASSIS	PRICE RANGE	PICTURE-TUBE SIZE (inches)
ADMIRAL	G11 G12 G13	$350-open N.A. $520-$1,000	21 25 23
DUMONT/ EMERSON	120790 120808 120814	$600-$900 $380-$750 N.A.	25 21 19
GENERAL ELECTRIC	CB HB	$370-$700 $250	21, 25 11
HEATH (KIT ONLY)	GR53A GR25	$425-$485 $530	21 25
MAGNAVOX	45-series T-904	$400-open N.A.	21 23, 25
MOTOROLA	TS908 TS914 TS917	$625-$1,395 $480-$600 $700-open	23 23 25
OLYMPIC	CTC16, 17	N.A.	21, 23, 25
PACKARD-BELL	98C 99C1	$600-$1,300 $380-$570	23, 25 21
PHILCO	16M91 16QT85 17K150	$370-$540 $675-$850 $450	21 25 19
RCA	CTC16X CTC17X CTC19	$350-$700 $650-$725 $400	21 25 19
SEARS/ SILVERTONE	10130 62240 All others	$270-$280 $570-$700 $320-$550	16 25 21
SETCHELL-CARLSON	U802	$580-$1,168	23, 25
SYLVANIA	DO1 DO2 DO3	$350-$529 $600-$819 $370-$420	21 25 19
WESTINGHOUSE	V24, V26	$350-$695	21, 23, 25
ZENITH	24MC32 24NC31 25MC36(46)	$350-$480 $500-$750 $625-open	21 21 25

Notes: [1]Except on lowest priced sets. [2]23" picture tube uses conventional phosphors. [3]23" picture tube has bonded face.

You can get them in small cabinets.



23"-25" rectangular.

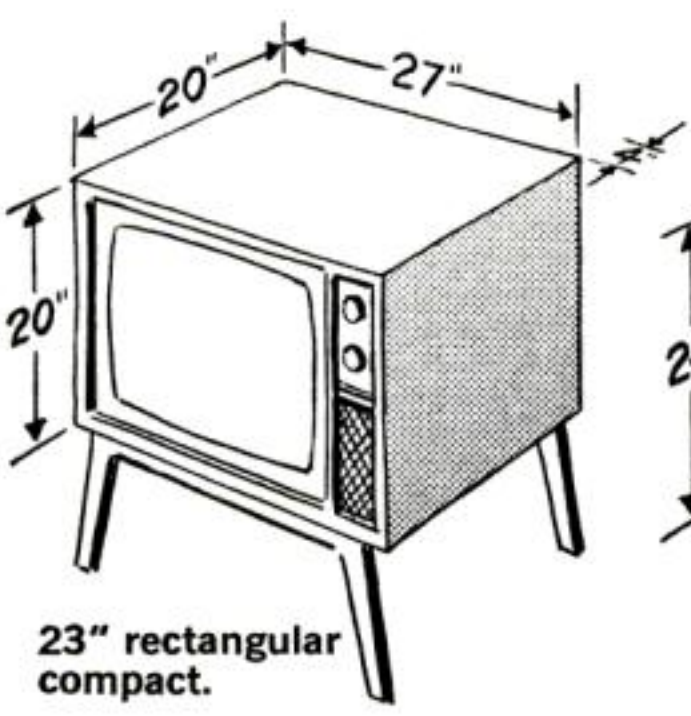
Urheberrechtlich geschütztes Material

BUYER'S GUIDE TO '66 COLOR TV SETS

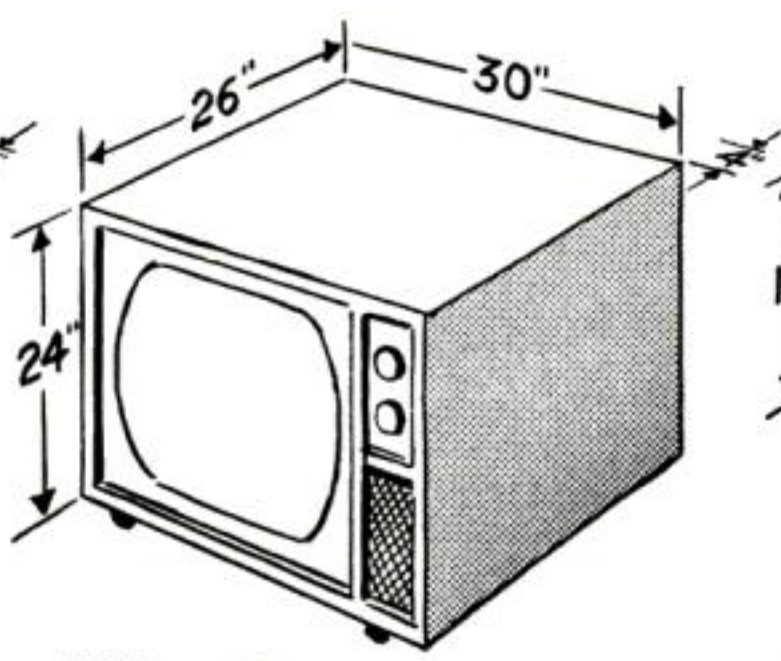
PHOSPHOR	BONDED-FACE PICTURE TUBE?	NUMBER OF TUBES	NUMBER OF DIODES	NUMBER OF TRANSISTORS	NUMBER OF TUBE FUNCTIONS	NUMBER OF I.F.'s	I.F. BANDWIDTH (megacycles—50% down)	NUMBER OF VIDEO STAGES	HIGH VOLTAGE (kilovolts)		REGULATOR TYPE	PRINTED CIRCUIT OR HAND WIRED	COLOR INDICATOR	DEGAUSSER	NUMBER OF COLOR CONTROLS
									3 BEAMS	NO BEAMS					
RE	OMM	20	14	1	41	3	3.6	2	21	27	F	PC	No	A[1]	3
RE	Yes	27	16	1	51	3	3.6	2	24	25.5	S	PC	No	A	3
C	Yes	20	17	1	44	3	3.6	2	21	27	F	PC	No	A	3
RE	Yes	26	14	1	46	3	3.5	3	25	25	S	Both	No	A	3
RE	Yes	26	13	1	45	3	3.5	3	24	24	S	Both	No	A	3
RE	Yes	26	13	1	45	3	3.5	3	24	24	S	Both	No	A	2
RE	Yes	18	24	2	27	3	3.85	3	25	25	F	PC	No	A	2
C	Yes	13	13	1	24	3	3.85	1	15.5	N.A.	None	PC	No	M	2
RE	Yes	26	8	1	49	3	3.58	2	24	24	S	Both	No	M	2
RE	Yes	27	10	1	52	3	3.58	2	25	25	S	Both	No	A	2
RE	Yes	27	10	1	50	3	3.6	3	22.5	25	S	Both	No	A[1]	3
RE[2]	Yes	28	11	1	52	3	3.6	3	22.5	25	S	Both	No	A	3
C	Yes	27	12	1	54	3	3.6	2	24	24	S	HW	Lamp	M	3
C	Yes	18	12	2	40	3	3.6	2	24	27	F	HW	Lamp	M	3
RE	Yes	27	12	1	54	3	3.6	2	24	24	S	HW	Lamp	M	3
RE[2]	No[3]	27	13	1	38	3	3.75	3	25	26	S	Both	Lamp	A	2
RE[2]	Yes	27	12	1	43	3	3.58	2	24.5	25	S	HW	No	M	2
RE	No	26	8	1	42	3	3.58	2	24.5	25	S	HW	No	M	2
RE	Yes	25	13	1	48	3	3.5	2	23.5	24	S	Both	No	A	2
C	Yes	16	22	10	54	3	3.5	3	23	26	F	Both	No	A	2
C	Yes	16	22	10	54	3	3.5	3	23	26	F	Both	No	A	2
RE	Yes	25	14	1	49	3	3.58	3	25	25	S	PC	No	A[1]	2
RE	Yes	25	16	2	52	3	3.58	3	25	25	S	PC	No	A	2
RE	Yes	22	14	1	45	2	3.58	2	24	24	S	PC	No	A	2
C	No	27	10	1	43	3	3.58	2	19	19	S	HW	No	None	2
RE	Yes	26	14	1	42	3	3.58	3	24	24	S	PC	No	A	3
RE	OMM	27	13	1	42	3	3.58	3	24	24	S	PC	No	A[1]	3
RE[2]	Yes	28	16	1	42	3	4.0	3	25	25	S	HW	No	A	2
RE	No	26	14	2	46	3	3.58	2	24	24	S	PC	No	A[1]	2
RE	Yes	27	16	2	50	3	3.58	2	25	25	S	PC	No	A	2
RE	Yes	19	21	2	44	2	3.58	3	21	24	F	PC	No	A	2
RE[2]	OMM	27	12	0	31	3	3.5	3	24.5	24.5	S	PC	No	A[1]	2
RE	Yes	24	13	0	45	3	3.8	1	24.5	25	S	HW	No	A[1]	2
RE	Yes	24	13	0	45	3	3.8	1	24.5	25	S	HW	No	A	2
RE	Yes	25	14	0	46	3	3.8	1	24.5	25	S	HW	No	A	2

Symbols: N.A., not available; C, conventional phosphors; RE, rare earth phosphors; OMM, on most models; A, automatic degausser; M, manual degausser; F, feedback regulator; S, shunt regulator.

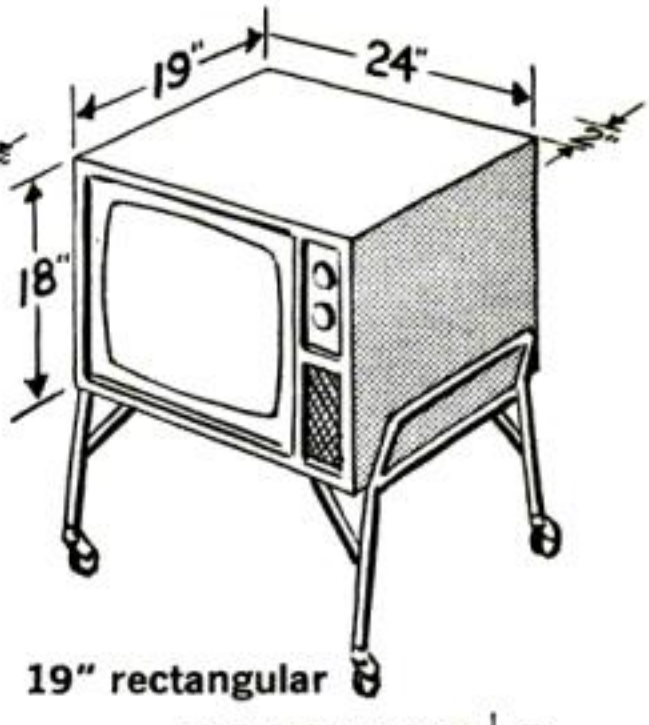
Secret of a big screen in a small cabinet: knowing what to order



23" rectangular compact.



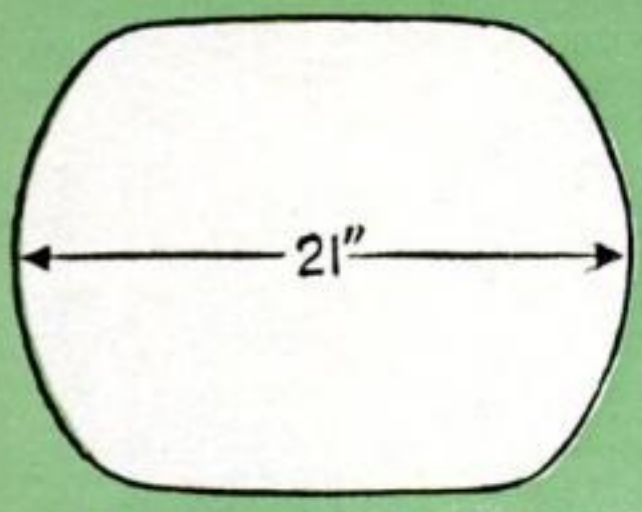
21" round.



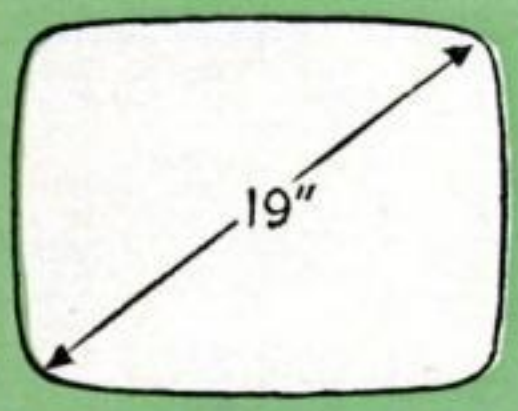
19" rectangular

Urheberrechtlich geschütztes Material

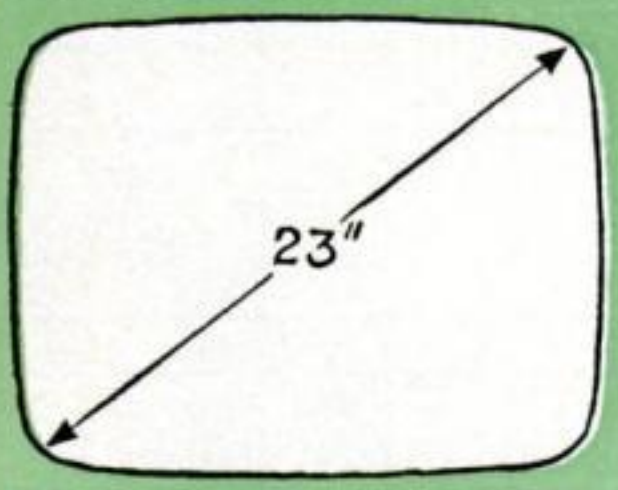
Round or rectangular? Here's how they stack up



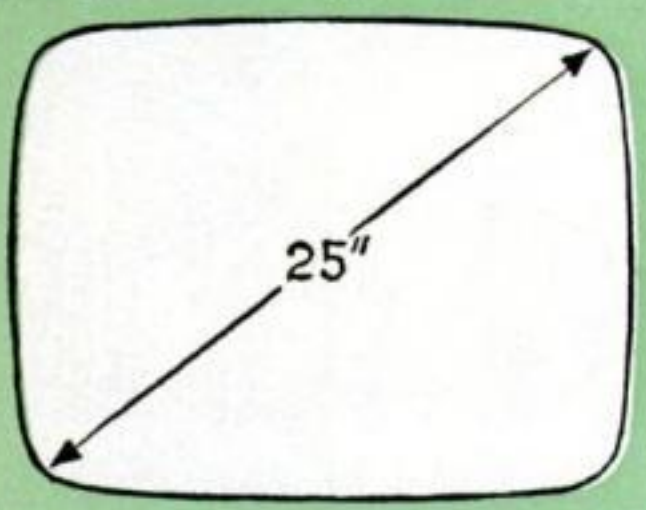
Victim of its round edges and too-long neck, the 21" round color tube is doomed. And yet, it still produces the best color picture of all with the least distortion.



Too small for living-room consoles, too big for portables—that's the story of the 19" rectangular tube. It seems chained to a lifetime of budget cabinets and carts.



Popularity of the 23" tube is the result of the general unavailability of its big brother, the 25". Most 23" tubes are in cabinets designed originally to take the bigger tube.



King of color tubes is the 25"—or it will be when manufacturers lick the distortion problems. Still, it's royal right now, judging by its princely price and general rarity.

of the five million color TVs in use today were bought during the past year. Even more startling: Manufacturers can't keep up with the demand for new sets. At last count there were three eager buyers for every two color sets coming off the assembly lines.

Fortunately, the color-set squeeze should be over by early next year—the prime cause is a temporary shortage of color picture tubes, especially rectangular-screen models. The cure is on the way: Color-tube manufacturers are tooling up for increased production.

This year you can really pick and choose. At long last, there are significant differences among the various makes of color sets: differences in circuitry, in screen sizes, and in the character of the color pictures they produce. Any of these are valid points of comparison.

When you go shopping, be sure to compare chassis types, not fancy names or charming cabinet styles. Although a manufacturer lists dozens of "different" color sets in his catalogue, most of the difference is skin deep. Look inside, and you will find only two or three basic color chassis.

How is your color TV vocabulary? If you are stumped by "convergence," "purity," "triad," "degausser," and "shadow mask," you'll find the answers on pages B2 and B3 of the booklet bound in after this article. Understanding the jargon puts you way ahead when you go shopping.

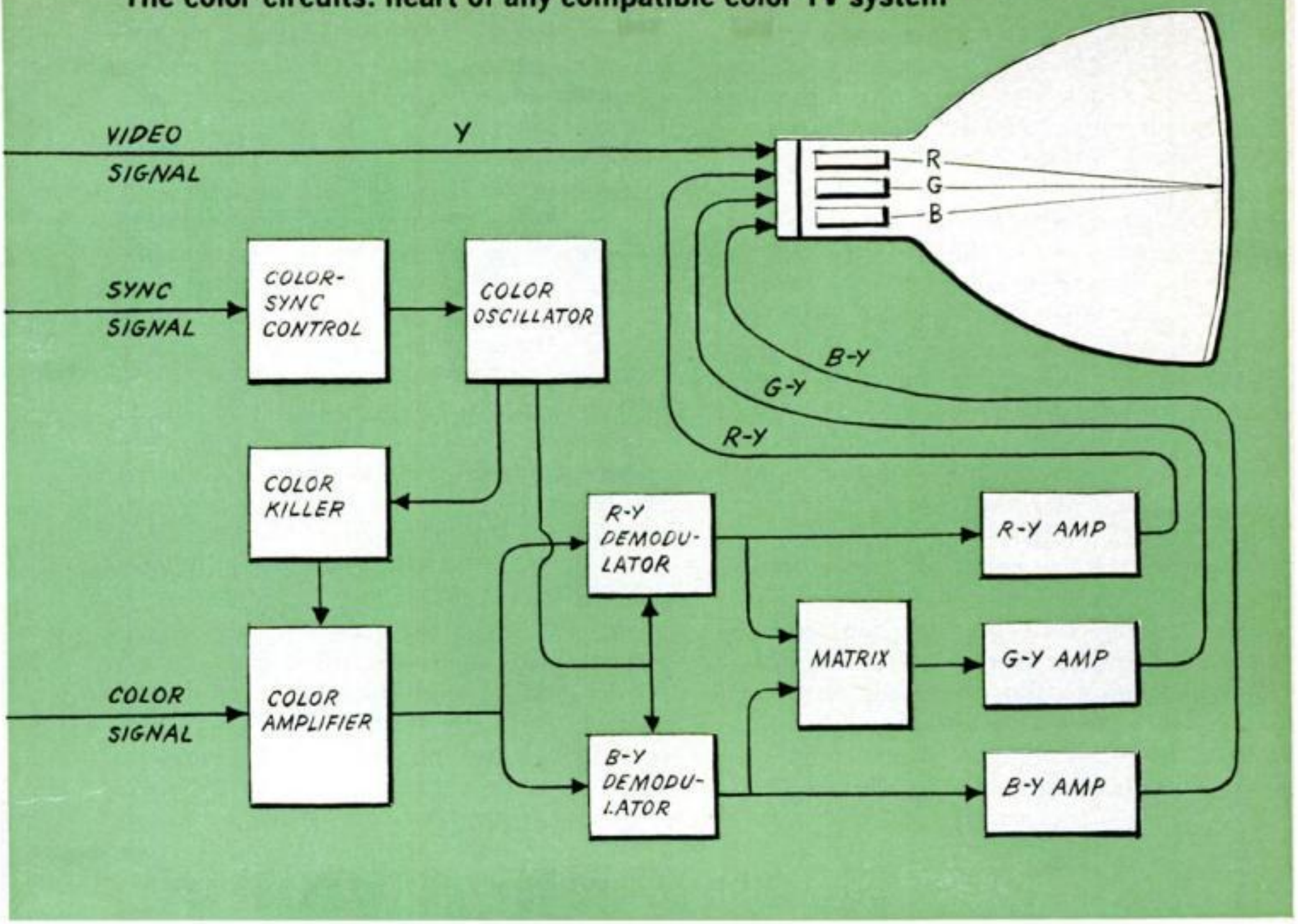
The price of color. Today it's realistic and stable. New prices probably will not go any lower than they are now, until the supply of color tubes far exceeds demand. That day looks to be many months away. It will not pay to wait any longer until you buy.

Here's a rundown of what your money buys in several different price ranges:

● Below $300. Hands-down honors for both the smallest and cheapest color set go to the GE $250 color portable. It has an incredibly simple circuit and a totally new beam-convergence system that shrinks its weight to 24 pounds. How does it perform? The picture is as good as I've seen. But keep these points in mind: Several inches of cabinet front frame the 11-inch rectangular picture tube, making it seem smaller than it is, and the built-in dipole antenna is useless in high-ghost areas such as big cities, or in a weak-signal fringe area: You may need an external antenna.

Urheberrechtlich geschütztes Material

The color circuits: heart of any compatible color TV system



The Sears 16-inch rectangular color set (made by Toshiba of Japan) represents the most-color-set-for-the-least-money we've seen. It sells for only $270; that's why we have excused its major sins: no internal degausser, and an external safety glass for the CRT.

● $350-$400. This is the land of the price leader. Shop carefully! Many of these 21-inch sets are not worth the money since they often use inferior tuners and sound systems, and come without degaussers and cemented-on (bonded) picture-tube safety glass.

If you are shopping for budget-priced color TV, the best buys in this price range are the newly designed 19-inch rectangular-screen roll-arounds.

● $400-$500. This is almost exclusively the domain of the 21-inch color set, although Motorola offers a 23-inch rectangular set for just under $500.

● $500 and up. Chassis and circuitry don't change much, but screen size increases to 25 inches, and cabinets become more elaborate; some include hi-fi sets.

Inside a color set. Its heart is the color-circuit section (see diagram) that decodes the picture portion of the incoming color TV signal, and transforms it into R, B, and G voltages to control the red, blue, and green beams in the picture tube.

The video portion of a color TV signal, labeled Y, carries information about picture brightness: $Y = R + B + G$.

Since R, B, and G represent the red, blue, and green light contributions to picture brightness, their sum represents the total.

The color portion of the signal represents the hue and saturation (relative amount of white light it contains) of the picture's colors.

Here's how they are combined:

The color signal, after passing through the color amplifier, is applied to the demodulator stages. The outputs are R — Y and B — Y signals. Since Y is made up of R and B and G, R — Y and B — Y contain

Continued

Urheberrechtlich geschütztes Material

enough information to reproduce G. This is done in the matrix. The output is G — Y. R — Y, B — Y, and G — Y are amplified and sent to the gun-control electrodes of the CRT; Y is applied to the cathode and the signals add within the CRT. Thus the three beam intensities are R, B, and G.

The color-sync control, through the local color oscillator, locks the color demodulator stages in step with the color-generating circuits at the transmitter.

The color killer switches the color circuits off during a black-and-white broadcast to keep the screen free from color streaks, flashes, and color "confetti."

The best place to begin shopping is at a dealer who stocks a variety of brands and models. You will want to look at, try, and evaluate each of these features:

Phosphor: Rare earth or conventional? Rare earth phosphor red—based on europium compounds—is brighter than conventional sulfide phosphor red. But the difference is much smaller this year than last, because of improved methods of handling sulfide.

Rare earth phosphor glows with a pure—or highly saturated—red color. It's close to the color of red poster paints.

Conventional phosphors radiate a less-saturated—almost pastel—red. You probably will find one of the reds more pleasing than the other.

CRT safety shield: Etched or clear? The safety-glass shield bonded to the CRT face may be etched to produce a sand-blasted appearance, or it may be left fully transparent. Clear glass transmits light best; you view a brighter picture. But the smooth, curving surface causes annoying reflections.

Etched (or fritted) glass stops the reflection, but also tends to dim and diffuse the picture.

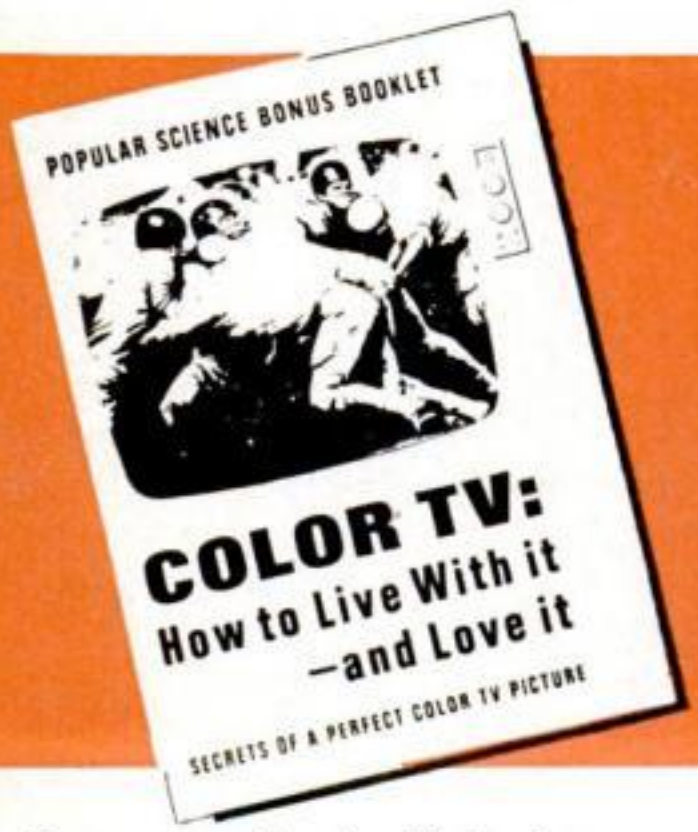
Color controls: Two or three? All color sets have these two basic color controls: *Intensity*—it acts as a color "volume" control; and *Hue*—to adjust the color of flesh tones in the picture. The controls may be labeled differently on some sets.

A few manufacturers add a third control —"color fidelity," or "tint"—that you use to enhance skin tones during color shows, and to set the most pleasing black during a

[Continued on page 198]

...and when you've bought a color TV

The bonus booklet facing this page takes up where your manual leaves off. Keep it near your set—it contains facts to help you keep your color TV easy to love.



INSTALLATION. How to be sure your dealer does it right. See page B6.

ANTENNA. Why you must use a color-rated model. See page B4.

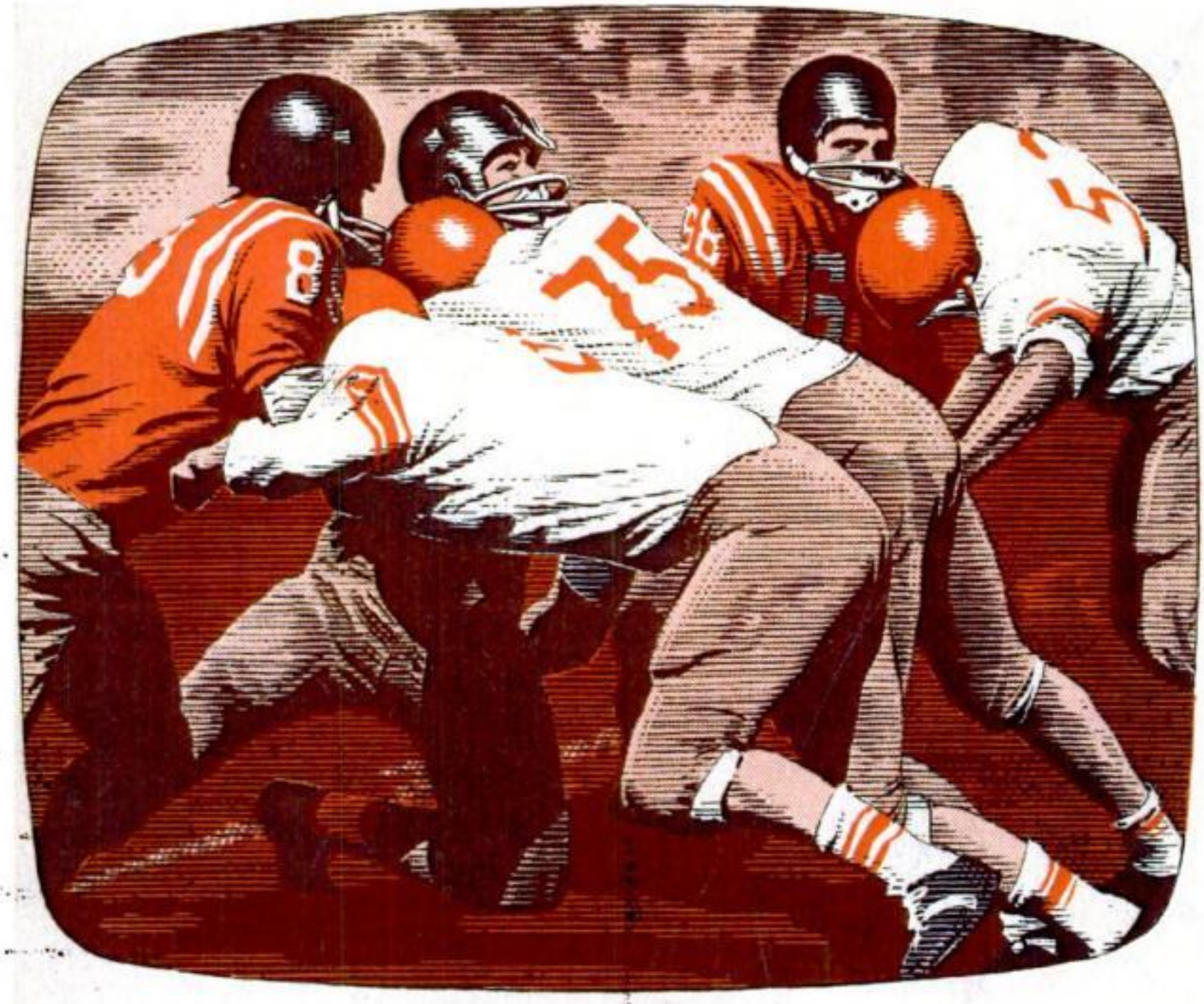
CONTROLS. It's easy to adjust them for perfect color. See page B8.

TROUBLE-SHOOTING. Hints on how to spot faults you can fix. See page B10.

To remove the booklet, place your left hand on this page, grasp the booklet with your right, and pull it away. Or slip a rubber band around the magazine under the booklet and, by lifting the rubber band, slit the edge neatly (sketch at right).

Urheberrechtlich geschütztes Material

POPULAR SCIENCE BONUS BOOKLET



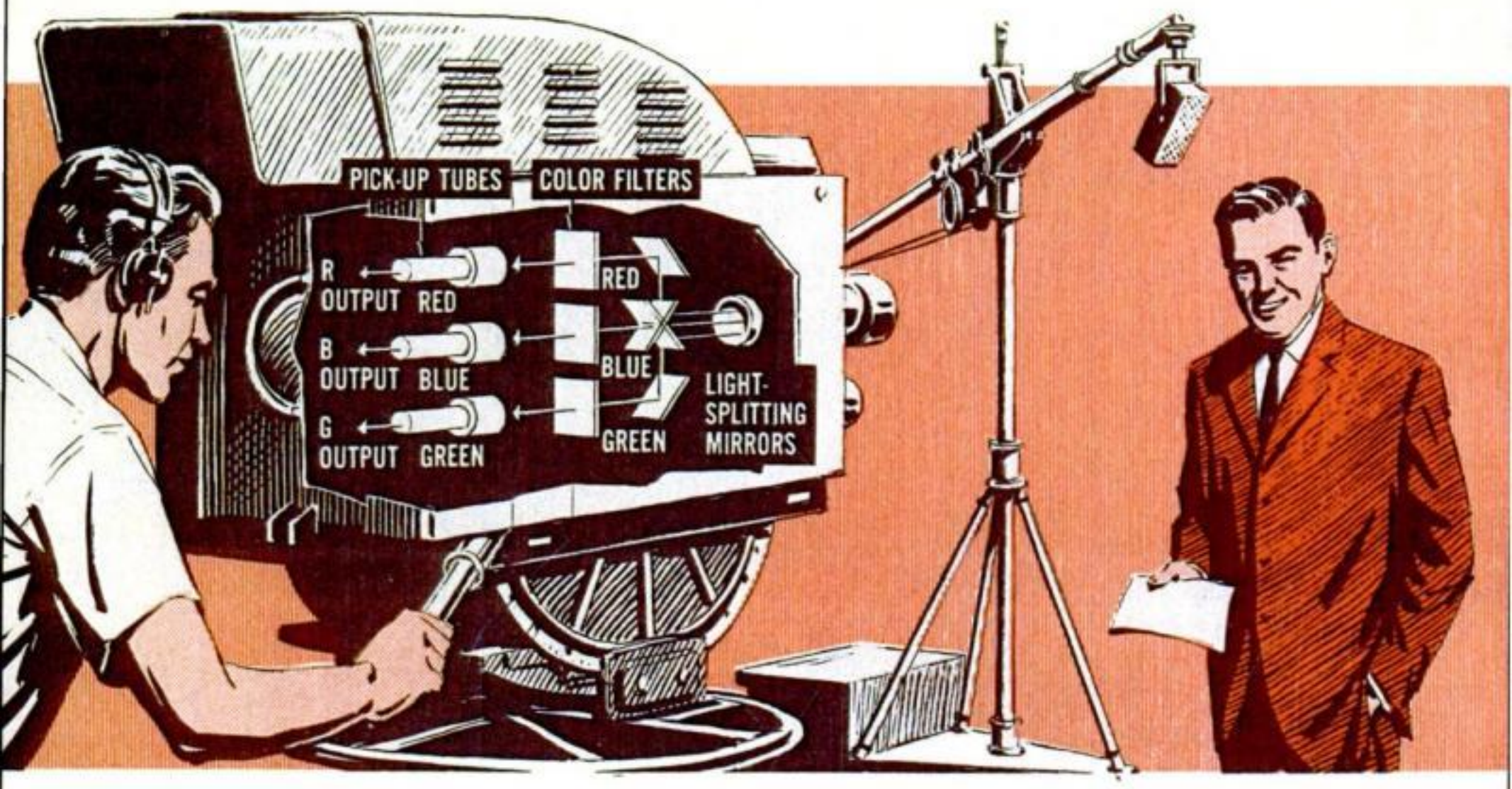
COLOR TV:

How to Live With it —and Love it

SECRETS OF A PERFECT COLOR TV PICTURE

Urheberrechtlich geschütztes Material

A PROPERLY ADJUSTED SET:



Be fussy! Some people are happy watching a color TV picture that looks like a wet page from the Sunday comics color section. We're betting you aren't one of them—that's why this booklet was written. Here, then, are three things the discriminating viewer can do to guarantee a perfect color picture on his set.

1. Watch closely when your set is installed. Every step shown on pages B6 and B7 is a "must." Don't be afraid to be fussy. At first you may not find a slight flaw objectionable, but when the novelty of a multicolor TV screen wears off, days later, that flaw will stick out like a sore thumb.

If possible, view a color show before the serviceman leaves your doorstep. Look for poor *convergence*—color fringes surrounding fine detail in the picture, as shown above (at the right). It's caused when the electron beams intersect before they reach the shadow mask. The beams strike the proper color phosphors, but they are not all in the same triad. Thus, the red, green, and blue images on the screen don't overlap completely.

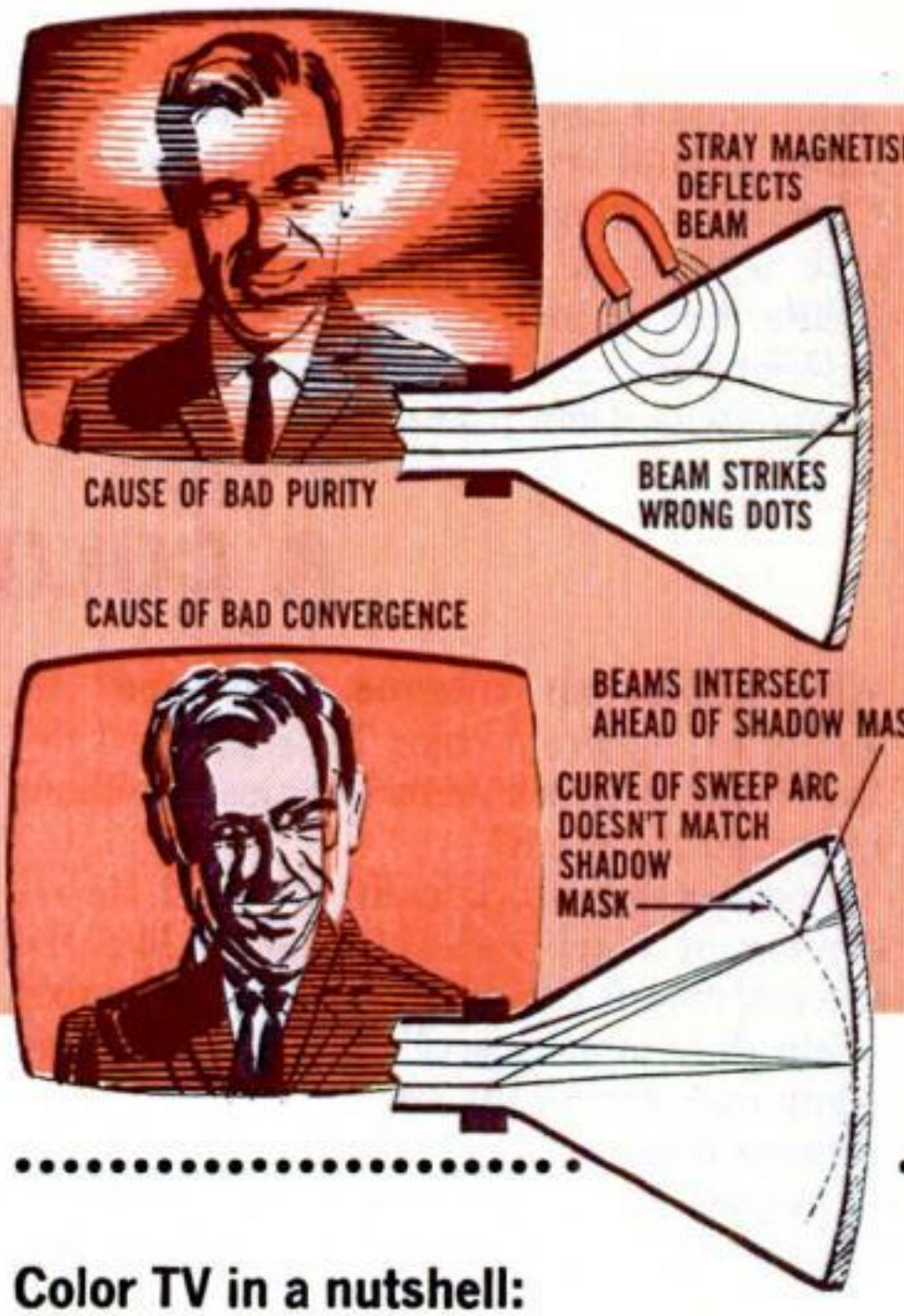
You should not notice *any* misconvergence at normal viewing distance. Your set's first convergence won't last long; a few months at most. Why? Brand new vacuum tubes change their characteristics noticeably early in their lives—these changes throw off the convergence adjustments. The second round of adjustments—identical to the "installation" procedure—will last much longer.

2. Get your family to cooperate. Teach every user of the set the correct way to tune-in a color picture and to adjust the color controls as detailed on pages B8 and B9.

3. Learn how to take care of your set. You can save real money if you recognize and remedy easy-to-fix troubles yourself. Antenna and lead-in faults, bad tubes, wrong control settings are things you can tackle. There are a great many things you can do from outside. Probably more than you think. The following paragraphs, and the trouble-shooting data on pages B10 and 11, will point you in the right direction.

Urheberrechtlich geschütztes Material

The key to perfect color pictures


STRAY MAGNETISM DEFLECTS BEAM
CAUSE OF BAD PURITY
BEAM STRIKES WRONG DOTS
CAUSE OF BAD CONVERGENCE
BEAMS INTERSECT AHEAD OF SHADOW MASK
CURVE OF SWEEP ARC DOESN'T MATCH SHADOW MASK

• *Correct bad purity*—large, blotchy areas in the picture tinted either the wrong color, or the right color, but weak or diluted. It happens when the CRT's electron beams are knocked off course—by a stray magnetic field—and hit wrong-color phosphor dots. Most common cause: slight magnetization of the shadow mask—it's made of thin steel—by the earth's magnetic field when the set is moved; or by a strong near-by external magnet, such as a hi-fi speaker.

Most newer sets have a built-in degaussing coil (demagnetizer) to neutralize the shadow mask's magnetization. Some coils are automatic, and operate whenever the set is turned on; others have a manual pushbutton. If, in your set, it isn't completely effective, or your set doesn't have one, use an external coil—see page B9.

Warning: Never hold a degausser close to the extension of the neck of the CRT at the back of the set; you will demagnetize the small permanent magnets mounted on the CRT to control beam motion.

• *Adjust back-of-the-set controls.* Some

Color TV in a nutshell:

Three pick-up tubes in the camera scan the scene through color filters. Their output—R, B, G—is the color recipe your set's cathode-ray tube (CRT) uses to make a picture: Blend R parts red light, B parts blue, G parts green. The CRT's three electron beams—each controlled by one of the R, B, or G signals—sweep in unison across hundreds of thousands of triads (clusters of three) of red, blue, and green phosphor dots. Each dot glows when hit by the corresponding beam. A perforated-metal shadow mask blocks off beams so they can't hit wrong color dots. Your eye blends the closely packed red, blue, and green pinpoints of light into a complete color picture.

Urheberrechtlich geschütztes Material

color sets have dozens, but don't touch any control that is not listed below—you might need a serviceman to undo the damage.

Video-peaking control—this may be either a switch or a potentiometer-type control. Adjust it if you can see any rainbow-like color bands around very fine detail in the picture. Choose a setting that minimizes the bands and, at the same time, doesn't produce noise (white flashes) in the picture.

Color-killer—see page B10.

Automatic-Gain Control (A.G.C.)—to set this one, tune it to the strongest local color station, during a color broadcast, and turn the control until the picture tears and breaks up. Back off just enough to stabilize it.

Note: Extensive changes of the following control settings may spoil the convergence. Just touch-up these controls, if necessary.

Vertical size (height)—controls overall height of picture.

Vertical linearity—controls relative size of the top-half of the picture.

Vertical and horizontal centering—controls

A COLOR-RATED ANTENNA:

What makes an antenna color-rated? Its ability to capture a color TV signal and deliver it to the set's antenna terminals, without distorting the signal.

Most antennas originally designed for reception of black-and-white only – like the veteran model you might have on your roof –introduce some type of distortion. They may "drop out" part of the signal. This means the antenna doesn't respond to a particular block of frequencies in the signal; or it may change the signal's shape by attenuating some frequencies more than others. Either fault can be fatal to a color signal. To understand why, you must look at a typical signal (right):

A color-TV signal is a complex blend of high and low frequencies that spans a frequency band six-megacycles wide. It is really three separate meshed-together and overlapping signals: video, color, sound.

Video—this signal controls the brightness level, and contains the information that is necessary to produce the fine detail of a color picture.

Color—this signal contains (in a disguised form) portions of the R, B, and G signals produced by the camera. The color signal covers a narrower band of frequencies than the video signal—it contains less detailed information. High definition isn't necessary here since the human eye can't distinguish the relative colors of two tiny objects lying close together.

Inside the color TV, the video and color signals are converted into control voltages that vary the intensity of the three electron beams.

The glow color of each triad on the CRT's face is proportional to the relative intensities of the three electron beams striking it. For perfect color, every bit of information crammed into a color signal must be delivered to the TV set by the antenna. That means: No drop outs or distortion allowed.

Color-rated antennas are designed to have the required smooth response across the entire color signal. Let your TV serviceman help you select the proper model for your location.

Install color-rated lead-in, too. The best (right) is coaxial cable (or coax). Because of its cylindrical geometry, a TV signal traveling down a coax lead-in is totally enclosed by the outer conductor. This shielding effect makes coax immune to troubles that plague side-by-side conductor lead-in:

- Interference—twin-lead and tubular lead-in can act like antennas and carry picture-patterning radio-frequency interference signals—from nearby electric motors or passing cars, for example—right to the set's antenna terminals.
- Color-ruining internal reflections—when one section of a twin-lead (and to a much lesser degree, tubular) lead-in lies next to a mass of metal, gets wet, is bent into sharp angles or squeezed out of shape, the section's electrical characteristics change: It acts like a length of different lead-in spliced in place. Incoming TV signals will reflect back-and-forth off these mismatched areas; often destroying the color-signal portion as they bounce.

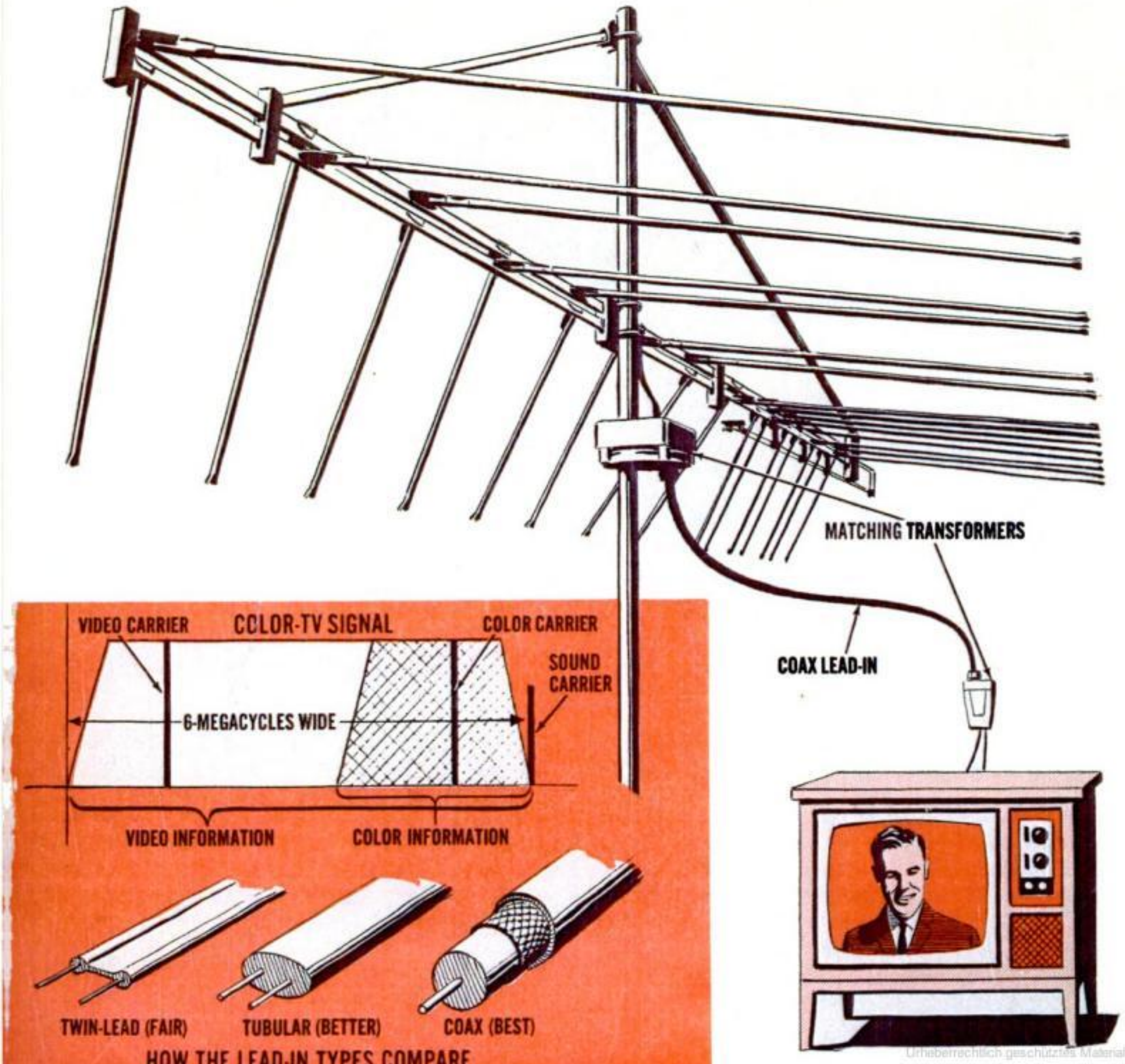
up-and-down and right-and-left movement of the picture on the screen.

Focus—adjust during a black-and-white show for sharpest visible horizontal traces.

Changing tubes. This chore is much the same as on your black-and-white set, but keep these points in mind:

- Leave alone tubes inside the metal protective cage on the chassis—replacing one usually requires a circuit readjustment; leave it to a serviceman.
- Yank tubes and test them one at a time, to avoid mixing up the same-type tubes: It's best to replace a tube that tests good in its original socket.
- Be sure you replace tube shields on the same tubes where you found them.
- Don't touch the convergence controls, if they are mounted inside the cabinet. And, when you reach in to remove or replace a tube, be careful you don't accidentally jolt the convergence-coil assembly. Either slip will cost you a complete convergence job.

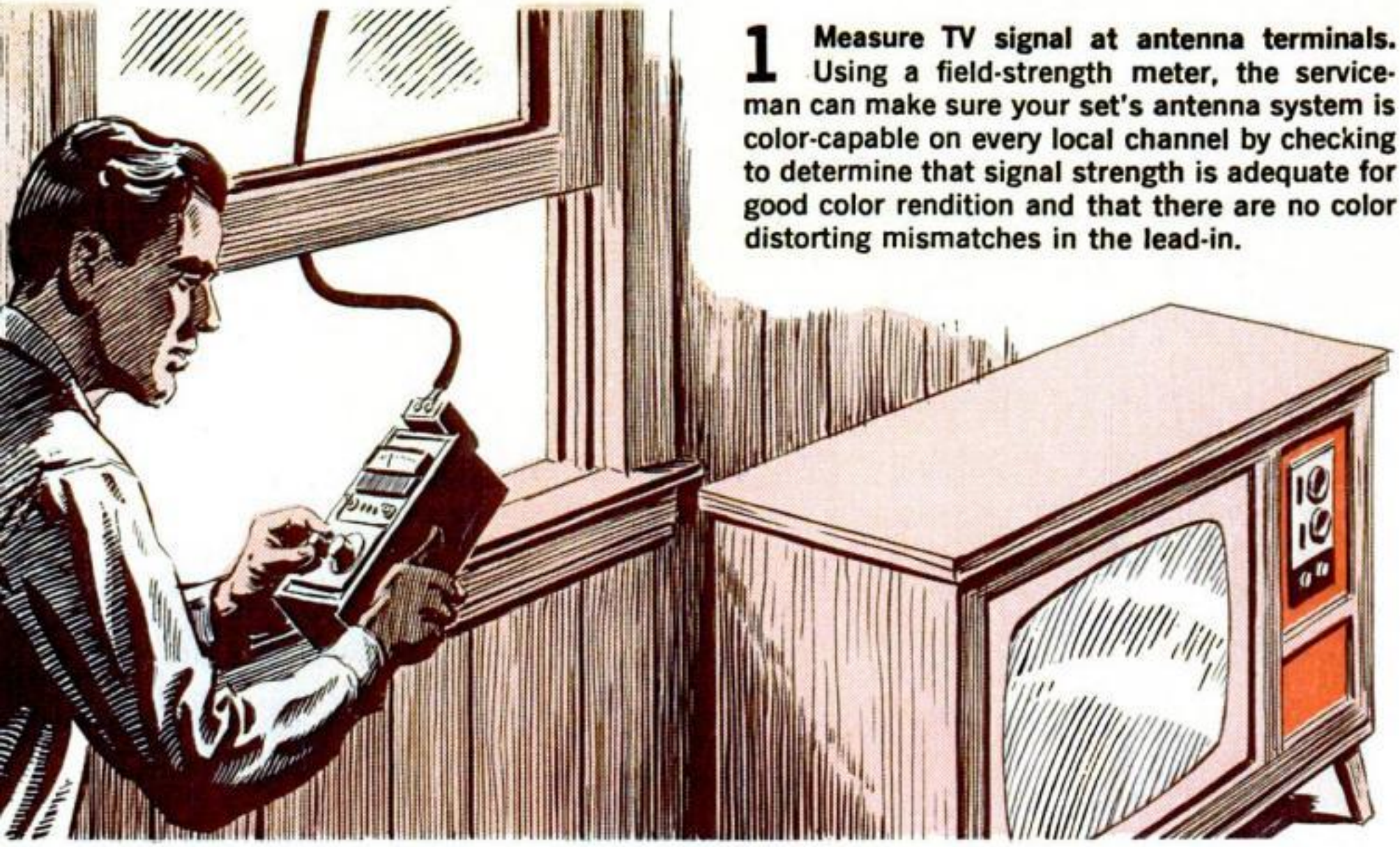
A must for perfect color

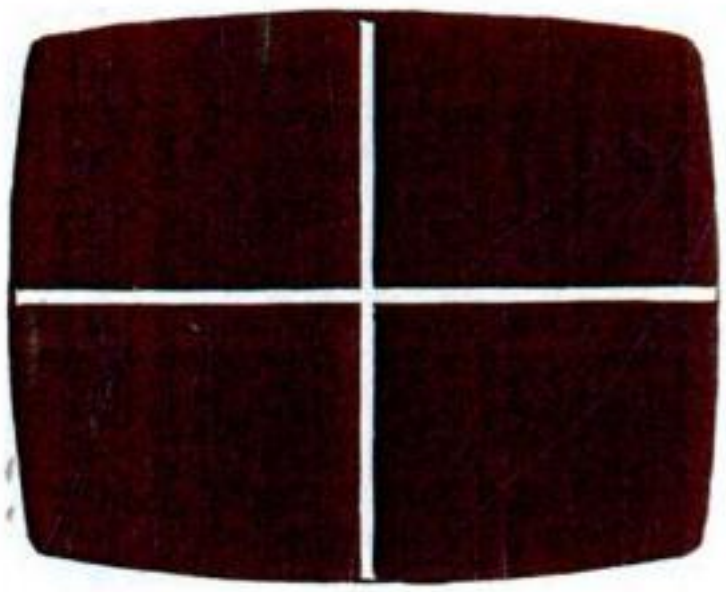


Urheberrechtlich geschütztes Material

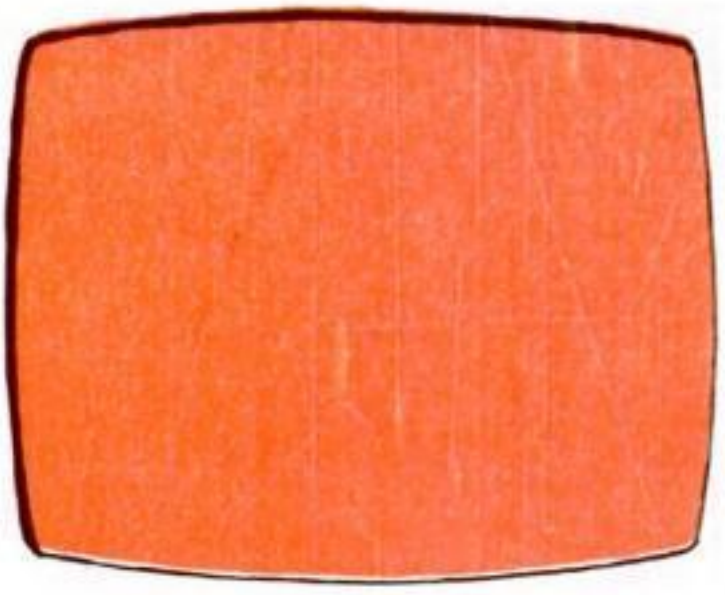
INSTALLATION: Make sure

1 **Measure TV signal at antenna terminals.** Using a field-strength meter, the serviceman can make sure your set's antenna system is color-capable on every local channel by checking to determine that signal strength is adequate for good color rendition and that there are no color distorting mismatches in the lead-in.





4 **Center the picture.** And adjust for best vertical and horizontal linearity, proper height and width, sharpest focus. On rectangular-screen sets, adjust for minimum "pin-cushion" distortion (distortion at picture corners). These adjustments must be made before the set is converged—later adjustment may upset beam convergence. The serviceman can use a broadcast test pattern as a guide, or special-purpose patterns (like centering gun-sight above) produced by his own pattern generator.



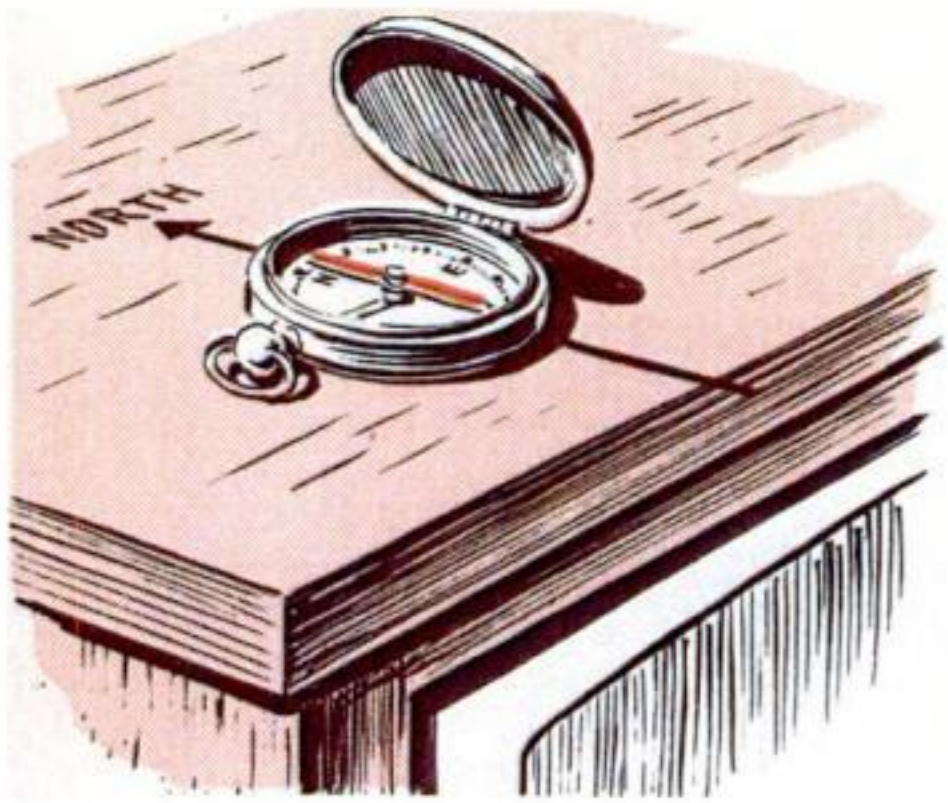
5 **Adjust for color purity.** First step is to check that the three electron beams intersect at center of the screen. Then, the blue and green beams are turned off, and the purity adjustments manipulated until the entire screen is a pure red. Since red is the weakest color, any impurities (usually pinkish, purple, and orange regions caused by the red beam striking blue or green phosphor dots) are easy to spot. On most sets, adjustment for red purity automatically takes care of blue and green.

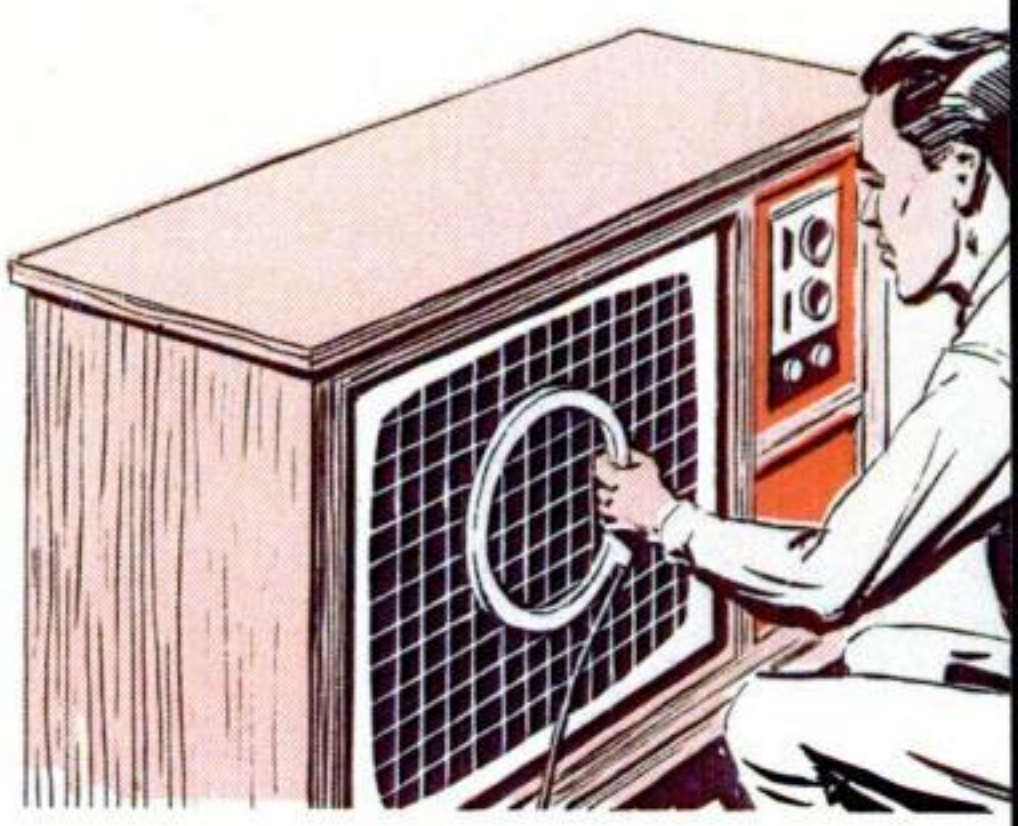
Urheberrechtlich geschütztes Material

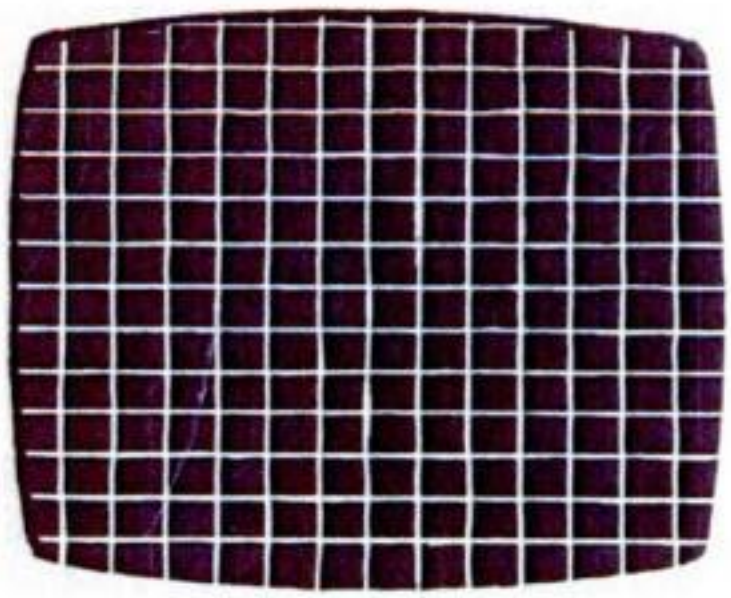
your dealer does it right

2 **Face the set north or south.** This aligns the CRT's axis parallel to the earth's magnetic field, minimizing its pull on the electron beams, and permitting accurate convergence. Shifting the set later, to its permanent spot, may cause minor color impurities that the set's degausser (or an external coil) can remedy.

3 **Degauss the CRT.** An external degaussing coil must be used, even if your set has a built-in degausser. No fixed-in-place internal coil can completely demagnetize the CRT's steel shadow mask—even the best have dead spots. Total degaussing is vital—a trace of magnetization makes accurate convergence impossible.







6 **Adjust convergence.** The best way to do this is with a cross-hatch pattern (shown above). Most sets have nine convergence controls; the serviceman adjusts them in sequence, going back again now and then to touch-up settings. At very close inspection, convergence should be perfect along center vertical and horizontal lines; you may see some red and green fringing in corners, which gets more noticeable farther from center. Viewed from four feet or more, all parts should look perfectly converged.

7 **Check for proper color rendition.** A color-bar pattern (one of several types is shown above) is used for this. The serviceman should make sure your set can reproduce the full range of transmitted colors, and that the front-panel hue (or tint) control has the proper range of adjustment (pattern colors must be accurate when control is at its center point). He should also adjust *gray-scale tracking* to insure that "whites" in a black-and-white picture don't become tinted as the brightness level changes.

Unauthorized Material

THE COLOR CONTROLS: How to

1 Adjust fine tuning. Here's a rule of thumb: For a perfect color picture, start by tuning in a perfect black-and-white picture—first switch to a color broadcast, and turn the color-intensity control full off. Next, experiment with the fine tuning. At one end of its range, the picture becomes blurry; at the other end, a herringbone pattern covers the screen. To set fine tuning, tune for the herringbone pattern, then back off slowly, stopping at the point where the herringbone disappears.

2 Adjust brightness and contrast. As you advance the brightness control, you will reach a point where any further increase makes the picture bloom (gets larger and become blurry). Never turn the control beyond this point. That's the only rule; the best setting below this point depends on the room lighting and your personal preference for viewing.

When setting for contrast on most color sets, the best bet is to give it slightly more than for normal black-and-white viewing. But use contrast sparingly; too much washes out pastels.

FIRST AID FOR FAILING COLOR:

••••••••••••DANGER••••••••••••

A color TV's high-voltage supply delivers 25,000 volts DC. Never "cheat" the safety interlock; keep hands outside when power cord is plugged in.

••••••••••••••••••••••••••••••

Is a bad tube to blame? Probably—if the antenna and lead-in are okay and the color controls are set correctly.

A drugstore emission-type tube-tester, though fine for checking many of your set's tubes, will overlook slight, but color-spoiling, faults in critical tubes. The best way to test these, is to replace probable suspects one at a time and see if the trouble disappears. You'll need a carefully chosen assortment of extras. Check your set's tube-location chart, and buy spares for tubes that do the following jobs:

First, 2nd, 3rd (and in some sets, 4th) video I.F. amplifier; color amplifier (or color I.F., or chroma band-pass amplifier); color demodulator (if two or three tubes are used, each will have a different label: R – Y, G – Y, B – Y, X or Z); color-oscillator; color-burst amplifier (or color sync); and the reactance tube.

No set will use all of these, and you need only one spare for a tube type used more than once. When trouble develops, use them like this:

Black-and-white picture during color show: Replace color-oscillator and color amplifier; check color-killer tube and control setting (see top of page 10); replace color demodulator, if a single tube; check A.G.C. tube and control setting (see top of page 4); check tubes in tuner stage. Try replacing video I.F. amplifier tubes in 4-3-2-1 sequence.

Bad color, poor black-and-white, and bad sound at same time. Check tuner tubes. Replace 1st video I.F. Check A.G.C. tube and control setting. If sound is okay, check video amplifier tube(s); replace 2nd, 3rd, 4th video I.F. tubes.

No fine detail during color show, and no black-and-white. Check video amplifier tube(s).

Urheberrechtlich geschütztes Material

set them for realistic color

3 **Advance the color-intensity control.** Think of this knob as a "color-volume" control: If it's set too low, you lose some of the color being broadcast; if it's set too high, the color you see is distorted—showing loss of fine detail, horizontal color streaks, highly exaggerated colors, absence of pastel shades, color fringing. To find the best setting, advance the control full clockwise (maximum color), then back off until the last signs of color distortion disappear.

4 **Adjust the hue (or tint) control.** Concentrate on skin tones —other colors will take care of themselves. At one end of the control's range, skin looks sickly green; at the other, apoplexy purple. Finding correct setting in between requires a discerning eye. Let someone else turn the control while you direct—it's easier to judge flesh tones from a distance than it is close up. If your set has a third color ("fidelity" or "tint") control, set it at midposition when you adjust hue, and touch up its setting later for best flesh tones.

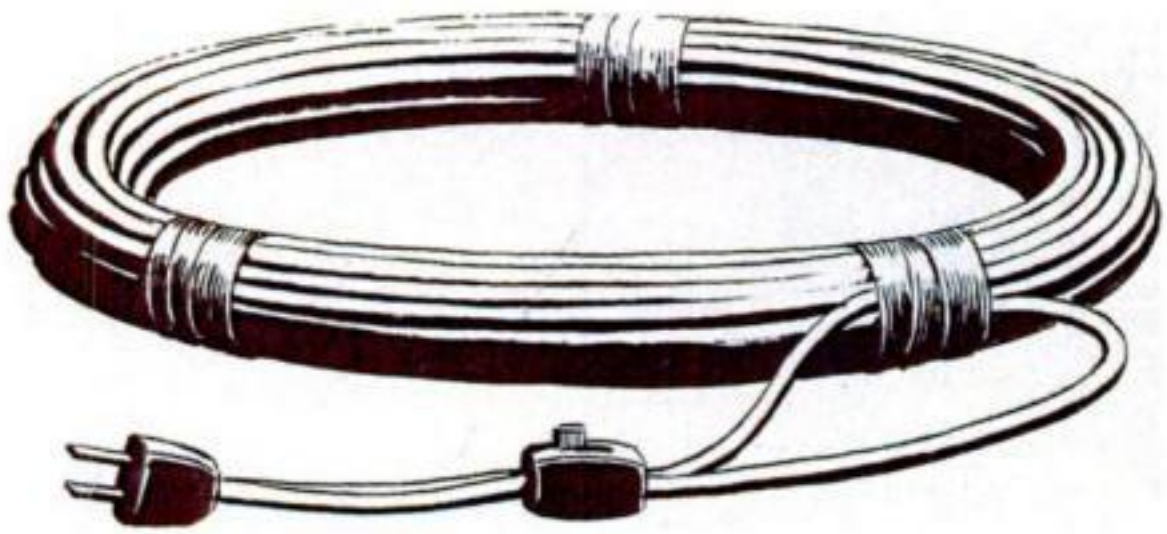
What you can do at home

Screen tinted one color on black-and-white. Have serviceman readjust electron-beam-intensity controls; have him check CRT.

Color snow during color show. Check tuner tubes; recheck antenna, lead-in.

Color intermittent, fluctuating, or weak. Replace color-oscillator tube and color amplifier tube(s). Check A.G.C. tube and control setting. Replace video I.F. amplifiers in 1-2-3-4 order. Check tuner tubes; recheck antenna.

Bad purity. If the built-in degausser has limited effect, or the set doesn't have one, try a hand-held coil. Make your own (above, right): Wind a 450-turn, 12-inch-diameter coil of No. 20 enamel-covered magnet wire (you'll need about 1,420 feet of wire). Add a lamp-wire power cord, a cord-mounting on/off switch and a 117-volt AC plug. Wrap the finished degausser with plastic electrical tape.



Always power the degausser through a long (12-15 foot) extension. Don't flip the switch on or off if the coil is within six feet of the CRT—the sudden change of current causes a transient magnetic field that will magnetize—not demagnetize—the shadow mask.

Turn the degausser on at a distance, and approach the CRT. Using a slow, circular, scrubbing-like motion, pass the coil over all areas on the CRT's face—linger about 30 seconds—and over the cabinet's top, front, and sides. **Note: The plug will get warm if plugged in for more than a few minutes.**

Urheberrechtlich geschütztes Material

TROUBLE-SHOOTING GUIDE

Colored "confetti" visible during a black-and-white broadcast is caused by a faulty or misadjusted color-killer circuit: It isn't turning the color circuits off, allowing random noise pulses generated in the tubes to add color flashes and streaks to the black-and-white picture. To set the color-killer control, tune in the weakest local channel that broadcasts color. Starting with the control full clockwise, turn it counterclockwise slowly until the color fades from the picture. Then, advance it until full-strength color reappears. If the control has no effect, try replacing the color-killer tube.

Confetti during a color show is probably due to a weak tube in the set's tuner stage.

Picture predominantly one color during a color show. Check your set's tube location chart and test those tubes in the list below that are found in your set:

- RED: demodulator; R—Y demodulator; X demodulator; R—Y amplifier.
- BLUE: demodulator; B—Y demodulator; Z demodulator; B—Y amplifier.
- GREEN: demodulator; G—Y demodulator; G—Y amplifier.
- CYAN: demodulator; R—Y or X demodulator; G—Y and B—Y amplifiers.
- MAGENTA: demodulator; G—Y demodulator; R—Y and B—Y amplifiers.
- YELLOW: demodulator; B—Y or Z demodulator; R—Y and G—Y amplifiers.

Multicolored horizontal stripes—instead of normal color—during a color show is caused by loss of color synchronization within the set: The color-producing circuits are not locked in step with the incoming TV signal. Test the appropriate tubes used in your set:

- No color sync, but perfect black-and-white reception: 3.58mc color oscillator; burst amplifier; reactance tube; color-sync tube.
- No color sync, plus washed-out horizontal stripes, but perfect black-and-white reception: color-amplifier tube.
- No color sync, plus washed-out horizontal stripes, plus poor black-and-white reception: 1st video amplifier.

Urheberrechtlich geschütztes Material

FOR YOUR COLOR SET

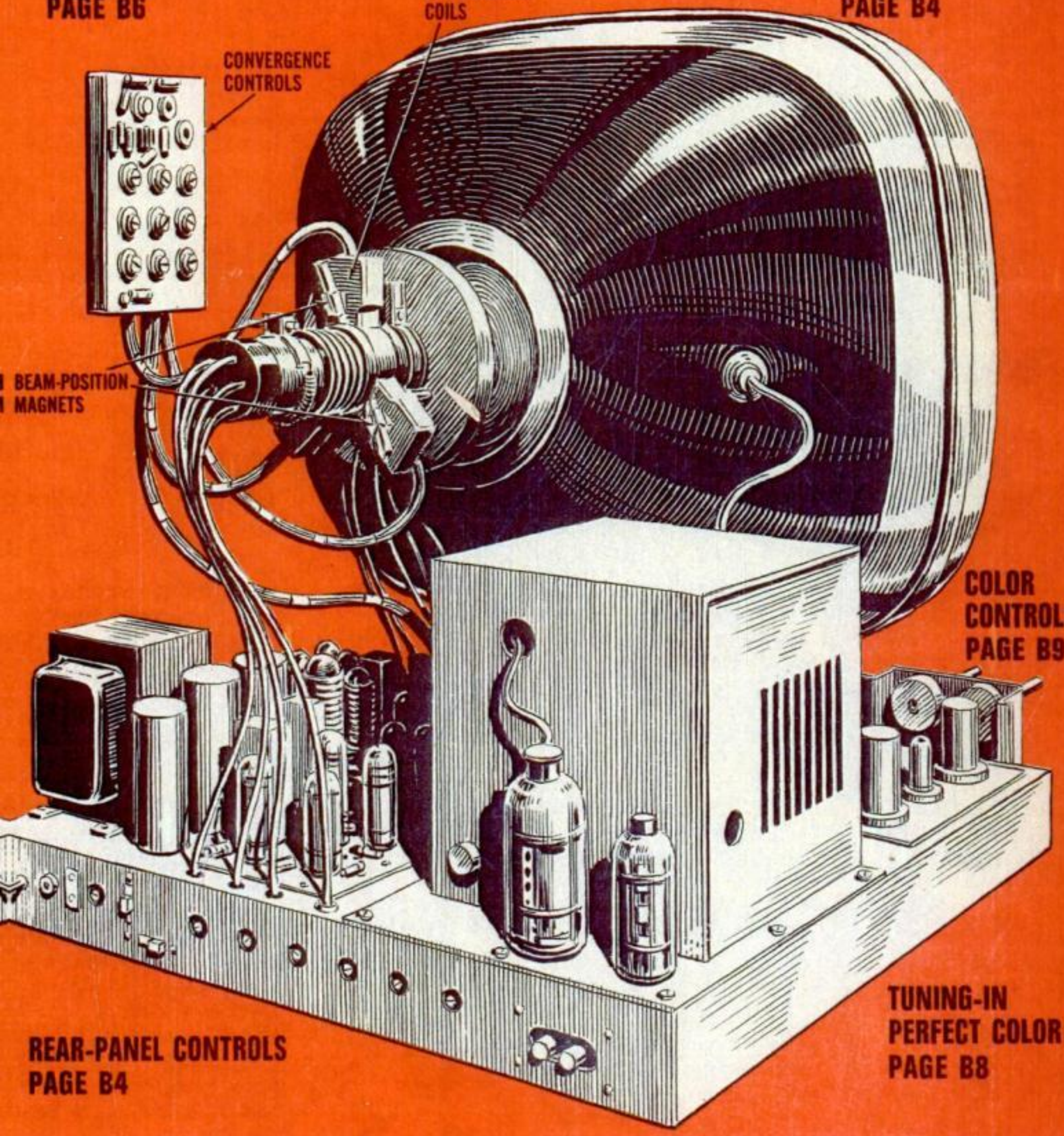
Symptom	How to cure it	Symptom	How to cure it
Insufficient width; height okay	Have serviceman adjust width control. Check horizontal oscillator, horizontal-output tube (or tubes); and damper.	Picture tears horizontally	Adjust the horizontal-hold control. If control has no effect, check horizontal oscillator and output tubes; horizontal phase detector (if a tube); and sync-separator tube.
Insufficient width and height	Check horizontal and vertical oscillator and output tubes. Have serviceman adjust picture-size controls.	Picture rolls vertically	Adjust vertical-hold control. If control has no effect, check vertical oscillator and output tubes, and sync separator.
Poor picture quality	Loss of color: adjust fine tuning. Poor color and b&w: adjust AGC. (see text); check antenna, lead-in and matching transformers; check tuner and AGC. tubes.	Picture okay, but no sound	Adjust fine-tuning; check sound I.F. amplifier tube, sound detector and audio-output tube.
Vertical distortion	Adjust vertical linearity and height controls in sequence (see text). Note: Large adjustments may spoil convergence.	Insufficient height, width okay	Adjust height control (see text). If control has no effect, check the vertical oscillator and output tubes.
Weak picture; loss of color	Adjust fine-tuning; check antenna, lead-in and matching transformers; check the tuner tubes, the I.F. amplifier and the video-amplifier tubes.	Blooming as brightness changes	Check contrast control, and setting of width and height controls (see text). Check horizontal oscillator and output tubes. Have serviceman check high-voltage rectifier and regulator tubes.
Out-of-focus, blurry picture	Adjust focus control for sharpest picture (see text). Note: Large adjustments may spoil convergence.	Horizontal lines or "herringbone" (sound bars)	Adjust fine-tuner to eliminate sound interference from picture. If control has no effect, have your serviceman readjust the sound traps.

Urheberrechtlich geschütztes Material

SECRETS OF A PERFECT COLOR TV PICTURE

INSTALLATION ADJUSTMENTS
PAGE B6

ANTENNA
PAGE B4



COLOR CONTROLS
PAGE B9

TUNING-IN PERFECT COLOR
PAGE B8

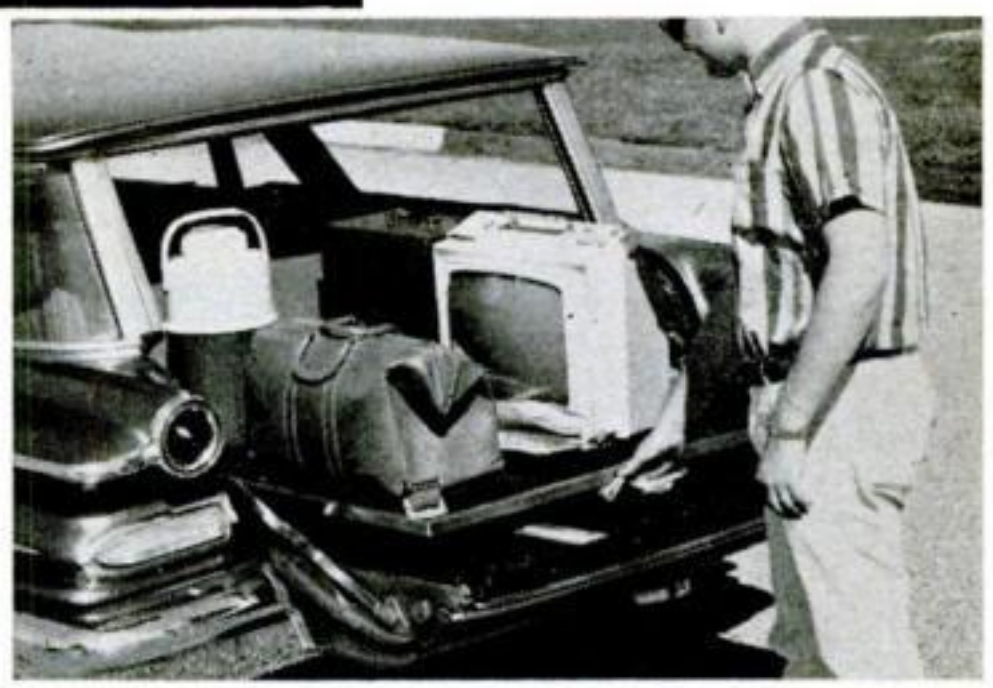
REAR-PANEL CONTROLS
PAGE B4

TROUBLE-SHOOTING THE CHASSIS
PAGE B10

WHAT'S NEW FOR YOUR CAR

Fluorescent portable light is shatterproof

The Longlite fluorescent lamp is contained in a transparent Tenite butyrate plastic housing with a convenient five-inch handle. The lamp is rated at a minimum of 7,500 hours and comes with an electric cord of either 25- or 50-foot length. The maker is Mobilite, Inc., 14217 Oxnard St., Van Nuys, Calif.

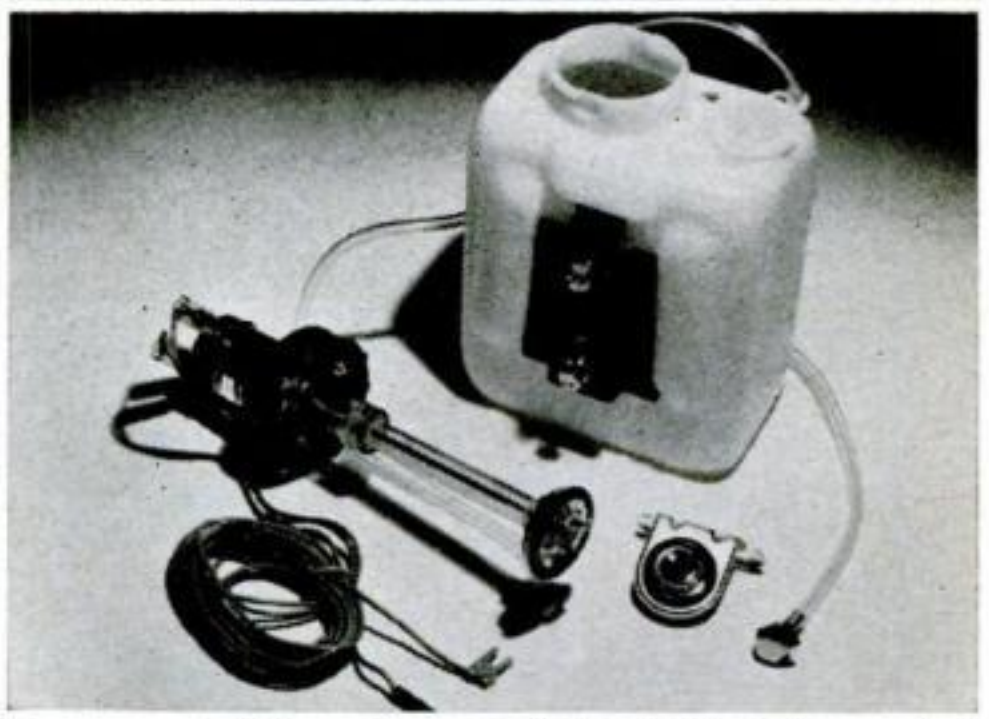


Rolling platform for station wagons

Heavy loads are often difficult to place in the back of a wagon. The Rol-O-Matic platform is designed to take the strain out of loading, by sliding back and forwards at the mere push of a handle. The platform is made of sturdy Novaply board, standard size is 43-by-48 inches, and it rides on ball bearings in aluminum tracks. It costs $147.95 complete from Rol-O-Matic Corp., 115 E. 129th St., NYC.

Electric windshield washer

While windshield washers will soon be standard on new cars, there are still millions of old cars without them. For them, this 6- or 12-volt washer might be the answer. The installation is simple; do-it-yourself instructions are included in the package. The motor is pushbutton-operated and the spray starts without delay and keeps on until the button is released. The nozzles are adjustable, so that the unit will fit any car, hit any windshield at the right angle. Made in Japan, it is marketed in the U.S. by Robert Bosch Corp., 40-25 Crescent, L.I. City, N.Y. 11101.



Here's an electric lock defreezer

Locks sometimes freeze despite precautions. One way to defreeze the lock is to heat the key, and it can be done electrically. This kit contains a socket (to go on the fender or under the hood) and a plug-in pencil-size heater which doubles as a key holder. The socket connects to the positive battery terminal. Plug the heater in, wait two minutes, then insert the key in the frozen lock. Repeat operation if necessary. The complete defreezer costs $3.95 from Marcel Brien, 1610 Henri-Bourassa East, Montreal, Can.

Urheberrechtlich geschütztes Material

Whopper chopper easily picks up an Army 155-millimeter howitzer weighing 6½ tons.

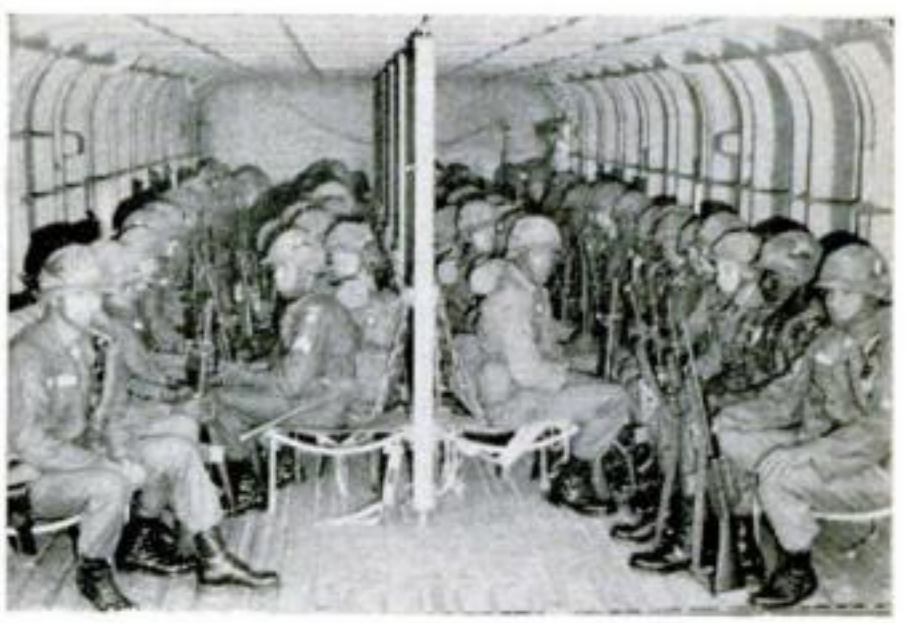
Biggest—and Ugliest—Chopper

Looking for all the world like a gargantuan, science-fiction grasshopper that has been built by a committee of runaway computers, a whopper chopper called the Skycrane is now at war in Vietnam.

It's probably the ugliest aircraft ever assembled. It's also the biggest helicopter. It's also the "liftingest" ever designed—it can tote 10 tons. It's versatile. It can carry guns, sections of pontoon bridges, trucks, or even other, smaller choppers. With a people pod snugged underneath, it can even transport troops.

Urheberrechtlich geschütztes Material

Pods are standard equipment. These are adaptable as command posts, hospitals, or radio stations.



For short hops, the Skycrane can carry a crew of three and a pod with 87 combat troops.

It can retrieve disabled smaller choppers. Another likely use: transporting artillery across rivers.

Airlift of a seven-ton pontoon-bridge section shows the crane's function in support of air assault.

Army truck weighing 13,300 pounds is picked up during a training flight at Fort Benning.

Goes to War

A workhorse, it may be called on in Vietnam for, among other things, retrieving damaged ordnance. An unspecified number of these great flying machines, made by Sikorsky, have been sent to the fighting front as part of the First Cavalry Division (Airmobile) that was recently dispatched overseas from Fort Benning, Ga.

All the descriptive figures on the Skycrane—known officially as the CH-54A—border on the incredible: Its overall height is 18 feet, 7 inches; its diameter (main rotor) 72 feet, and its length 87½ feet. It can fly 124 miles an hour on its two Pratt & Whitney gas-turbine engines, which produce 4,050 horsepower each.

The crane can carry 90 persons, 87 of them combat-equipped. That's the largest number any helicopter in the world can hold.

Urheberrechtlich geschütztes Material

How to get your money's worth

WHEN YOU

What I didn't know was that insurance covering the car was no good beyond the state line.

The booming car-rental business now offers you a surprising variety of services and options—but there are pitfalls. Here's what you should know before you get behind the wheel

One day recently I rented a car from a company that advertised Volkswagens at $3 a day plus seven cents a mile. This looked like a bargain, and at first blush it was. The company was as good as its word. I drove the VW 74 miles, returned it next day, and got out for less than $10.

What I didn't know until I returned the car was that the insurance covering it was no good beyond the state line. Moreover, in signing the contract, I unknowingly had submitted to a clause reading, "If this car is not returned within six hours of the time due, police will be notified that it is a stolen car."

I was in double jeopardy. I had driven beyond the state line, and neither the insurance on the car nor my own personal auto insurance probably would have been worth a thin dime if I had been delayed and the car had been reported "stolen."

This is to say that renting automobiles has become a wonderful convenience for tens of thousands of motorists every day, and at the same time a hazard—if you don't know your way around. In this article I am going to tell you about:

- The advantages and disadvantages of renting a car.
- Where and how to rent.
- The tricks to guard against.
- Leasing.

You can have delivered at your door anything from a VW to a Cadillac to a truck.

Suppose you're stuck at an airport late at night. It may be cheaper to rent a car than hire a taxi.

The pros and cons of car renting. First off, you just may be missing a bet these days if you don't, on some occasions, rent a car. The number—and variety—of rent-a-cars available is soaring. Five years ago there were about 30,000, mostly in big cities. Today there are nearly 130,000. Even in smaller communities you can phone a rental agency and have delivered at your door anything from a Volkswagen to a Cadillac, or from a Corvette Sting Ray to a Dodge station wagon or truck.

And why should you rent a car? There could be lots of reasons that may not have occurred to you.

Suppose you are stuck at an airport late at night; it may be cheaper to rent a car than hire a taxi. Or your own car may be in for repairs. Or your family may need a spare car for an emergency. You may need a station wagon to move a sofa. And, getting into truck rentals, you may want to save a king-size moving bill.

There could be other reasons: You'd like to try a sports car

Urheberrechtlich geschütztes Material

RENT A CAR

By E. D. FALES JR.

and maybe enter a weekend rally. You'd like to try out Detroit's brand-new models before buying one. (The big rental agencies get them early.) Or you just want to put on the dog at a swanky dinner date.

Finally, there are times when it's cheaper to rent a car than drive your own.

The disadvantage of renting is predominantly the expense. If you own a standard-size car and drive the national average of 10,000 miles a year, your cost per mile runs 10 cents and upward. That includes gas and oil, repairs, insurance, depreciation, licensing, and interest on your car loan. Gas and oil cost you about two cents. There is nothing you can do about your fixed charges. Therefore, on most rentals you gain nothing. Your costs will exceed 10 cents, and the fixed charges on your own car go right on while it sits in your garage.

On the other side of the coin, under some new economy rates you can rent a compact for a week for $45 with 800 miles free. You pay for the gas. The gas costs $12 to $14, so—on direct costs, mind you—you come out roughly $20 ahead of the cost of driving your own car.

Some contracts read that you have to return a rented car to the place where you picked it up. This can be a nuisance. So can the necessity of keeping the rental agency advised if you find that you can't return the car on time.

Where and how to rent. Rental agencies have proliferated. In addition to the Big Three—Hertz, Avis, and National—there are hundreds of others. Even some department stores have added a rent-a-car desk.

With the rental business booming, diversification has begun to appear. There are three classes of agencies: 1) The "standard-price" agencies, 2) the "cut-raters," and 3) the "pseudo cut-raters."

- The full-service renters, such as the Big Three, mostly rent brand-new, or nearly new, standard-size cars. They also offer some "specials"—low rates that apply for 16 hours overnight, on weekends, by the week or month, or for sports like skiing.

The Big Three and many of their competitors lean over backward to be fair because they have reputations to protect. But even so, you may not be given a special rate unless you know there is one and ask for it. If you just walk up and ask for "a car" you'll pay the full rate.

So ask to see *all* the rate schedules before renting. If you just need a car for an evening, there's no point in paying the full rate.

When you deal with one of the Big Three, cars and service are usually excellent, gas is free, insurance reliable, and you often have "free drop-off" privileges, which may mean you can

You may see a sign that says: "GALAXIES! IMPALAS! PONTIACS! $4.12!" But when you try to rent one you discover that a tiny "VW" is tucked away in the ad.

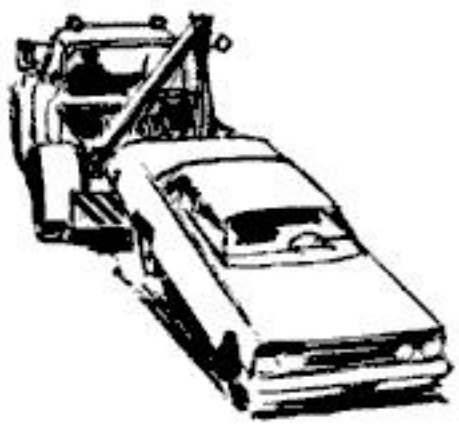
Some agencies simply don't maintain their cars. This may mean a breakdown on the road.

Who buys the gas? If you do, figure that the car will cost at least 1½ cents additional per mile.

Continued

Urheberrechtlich geschütztes Material

Why rent a car? Lots of reasons: Yours is in the shop . . . you



Who pays for towing if you break down? Some renters do. But some of them don't—you're on your own.

Before you take the car, walk around it. Look for dents, scratches. Then be sure that these are clearly noted in your contract.

leave the car in any of over 50 cities. Odometers, which often used to run high (and cost you slightly extra), now are mainly accurate.

• The cut-raters include many small local renters and a few quite reliable national chains like Econocar, Budget, or the new (Hertz-owned) Valcar. They rent new compacts, sometimes bigger cars that may be a year or two old, and occasionally a new big car. Insurance is usually the same that the full-service renters give: $25,000 property-damage insurance and $100,000-$300,000 for personal injury and death.

A few cut-raters who have out-of-town branches allow you free drop-off privileges in those towns. Others charge $15 or $20 extra, since they have to get their cars back. Most permit no drop-off at all; you must return the car to the same office.

• The pseudo cut-raters include the tricksters. They may advertise very low rates. But by extra charges for insurance, by charging to deliver the car, and by various other devices, they manage to run your bill up so it may equal, or exceed, what you pay a reputable cut-rater or even a full-service renter.

You may see a sign that says: GALAXIES! IMPALAS! PONTIACS! *$4.12!!!*

But when you try to rent one you discover that a tiny "VW" was tucked away in the ad or the words "9 a.m.-5 p.m. Tues. & Thurs. only" were all but hidden. True, you can get a VW for $4.12 but the Galaxies, Impalas, and Pontiacs are full-price.

Here's another example. The other day I saw an ad that said: "COMPACTS—IMPALAS—DODGES $3.96."

When I applied for a $3.96 car the manager said: "Sorry, that rate applies only to our compacts and we don't have any in today."

"Okay," I said, "sign me up for tomorrow."

He coughed and thumbed through his reservations book. He didn't have one for tomorrow, either.

Most of the full-service agencies will deliver your car and even take you home later. They will arrange to have a "meet-me" car waiting for you at an airport, railroad station, or hotel.

But some cut-raters don't. That can cost you taxi fares.

If you are late returning a car, most agencies charge a small "overtime," usually $1.50 an hour. But some charge for a full extra day.

HOW TO CHOOSE THE BEST RATE

People sometimes pay more for rental cars than they should—because they don't understand the rates. These vary from company to company, city to city, and even according to the day of the week. But here are a few samples to show how they work:

FULL-SERVICE RATES (as charged by big national companies). **Per 24-hour day:** $10-$12 plus 10-12 cents a mile. **Cars:** Usually new (less than 20,000 miles) Impalas, Galaxies, or Furies. **Services:** Free gas, repairs, towing. Advance reservations honored. Free delivery of car, and free "meet-me" service at airports, railroads. Free drop-off privileges in dozens of big cities. $15 drop-off charge elsewhere, in most cases. Credit cards honored in lieu of deposits.

SPECIAL RATES (as charged by some big standard-rate companies, and others). **Overnight** (5 p.m. 9 a.m.). $5 and 5 cents a mile, or $10 with 100 free miles. **Business day** (or "shoppers") 9 a.m.-5 p.m. Sample: **$6 and**

Urheberrecht ch geschützt Material

need a wagon to move a sofa . . . you want to test a new model

The contract may obligate you to pay a 15-cents-a-mile "return charge" if you have dropped off the car in another city. If the distance is 500 miles, that's $75 more out of your pocket.

Some agencies simply don't maintain their cars. This may mean a breakdown on the road.

The mechanics of car renting are simple. It's the fine type in the contract that sometimes throws you, and more about that in a moment.

Because of growing demand, phone in advance whenever possible for a reservation. A credit card usually allows you to take a car without paying the customary $25 to $100 deposit. It also means that you won't have to shell out cash to pay the rent: It will be billed to you.

Even if you don't have a credit card you may be permitted to forego a cash deposit, if you can establish a good credit standing. If you do have to pay a deposit, be sure you find out how you get it back if, for example, you bring the car in late at night. Sometimes, if no authorized cashier is around, you learn that a check for your deposit, less the amount of your bill, will be mailed to you. If you're on vacation and short of cash this can be inconvenient.

Now you're prepared to sign the contract.

The tricks of the trade. Read the contract. Be sure you understand the rate you're paying. A friend of mine signed a contract for a month's rental, asking for, and getting, a 20-percent discount because he worked for a company that enjoyed credit-card standing with the agency. When he returned the car—and the agency was thoroughly reputable—an argument developed over the discount.

"That's not allowed on monthly rentals," said the clerk.

"It's in the contract," insisted my friend. He won.

What does the contract say about buying gas? Who buys it? If you do, figure that the car will cost at least 1½ cents additional per mile. And who pays for gas now in the tank? Some cut-rate places measure it when you return and bill you for any you have used. If you use most of a tank, that's $5 extra. If the agency supplies the gas, be sure to keep vouchers for all you buy and turn them in. What you spend for gas will be subtracted from your bill.

[Continued on page 180]

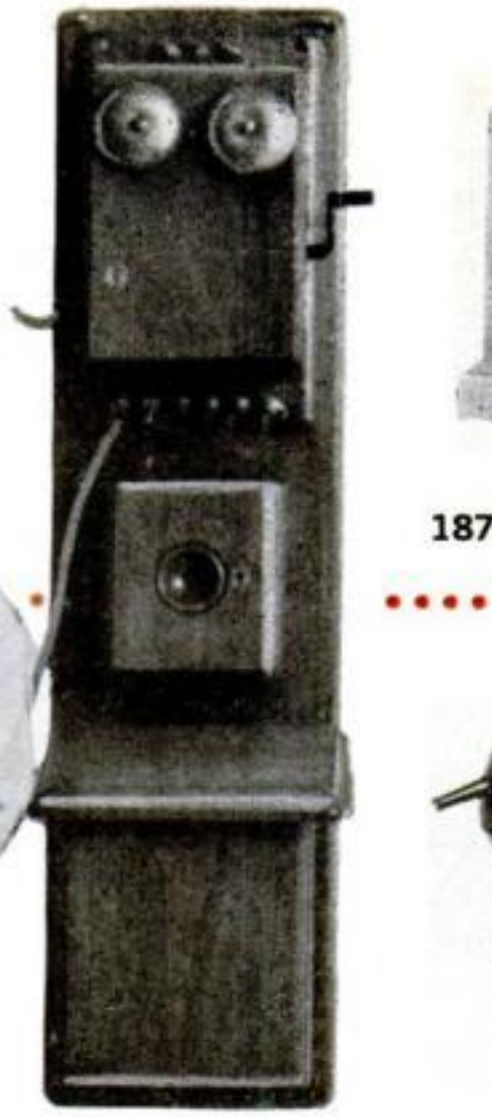
You can rent sports cars these days. Some recent rallies and races have been run with as many as three or four rented entries.

Leasing seems to work for some drivers who live in big cities where parking, garage, and repair costs have gone sky-high.

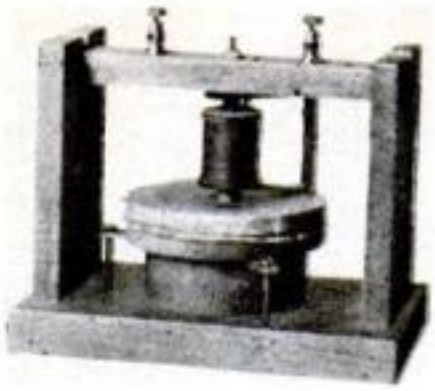
7 cents a mile. **Sporting events** (races, football, etc.). Sample: $6 and 7 cents a mile. Return car the same evening. **Ski weekend** (200 miles free). Sample: $25 includes skis, racks, parkas. **Business week** (five days, 9 a.m.-5 p.m.). Sample: $34.95 plus 7 cents a mile. **Seven-Day Week.** Samples: $55 includes 700 free miles. Compacts only. You buy gas. $65 for "new compact" includes 1,000 free miles. You buy gas. $99 includes unlimited free miles —all you can drive in a week—and one free tankful of gas. After that you buy the gas. **Month.** Sample: $99 for Valiant (on six-month basis). $75 for Tempest or $85 for Impala (on two-year-lease basis). Free mileage up to 25,000. Some maintenance is included. You pay for the gas.

CUT RATES per 24-hour day. **Samples:** $6 to $9 plus six to nine cents a mile. **Cars:** New compacts, less-than-new big cars, a few new big cars. **Services:** Usually you buy gas, but some companies pay for gas and also for repairs. Less chance of free delivery or free "meet-me." Many permit no drop-off privileges, even if you offer to pay extra. Some agencies will honor credit cards, waive deposits; others will not.

Urheberrecht ch geschütztes Material



1882—Magneto set



1875—Bell's gallows phone

1949—"500" desk set

They're Still

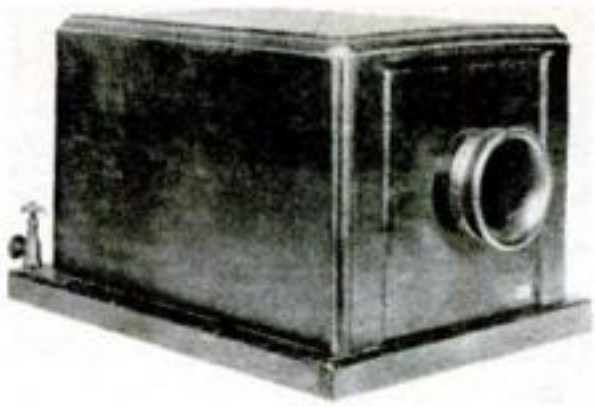
Some big changes are in the works: pushbutton phones, TV screens, and a computer exchange that dials the number for you

By HANS FANTEL

Everyone takes the telephone for granted —except the telephone company. They're never satisfied. Look at a few of the inventions Bell Telephone Laboratories recently pulled from its technical sleeve—inventions that are now being tested in use and will gradually find their way into every telephone system across the country.

• A computerized telephone exchange that lets you dial most-called numbers with two or three digits (even long-distance), dial your own conference calls with two or more parties, and transfer your calls to another number when away from home.

Urheberrechtlich geschütztes Material



1877—First commercial phone

1897—Brass desk set

1928—"French" desk set

1964—Touch-Tone set

1965—Trimline

19??—Picturephone (now in limited use)

Inventing the Telephone

● A TV telephone, the Picturephone, that transmits both images and voices.

● Telephones with pushbuttons, instead of dials, that allow you to place calls in seconds. Pleasing tones—a different one for each digit—replace dial clicks.

● Special-purpose telephones with built-in intercoms like the Panel-Phone; the Speakerphone with a desk-top speaker and microphone for hands-free group conversations; and the Sensicall telephone attachment for the deaf that translates sound into long and short light flashes, and vibrations that can be felt with the fingers.

● Business telephones that automatically dial a number from a perforated code on a card. You just stick the card in a slot. And a Data-Phone designed to let computers "talk" to each other in computer language.

● A rural pay phone—this one developed by an independent manufacturer—for remote areas that operates via microwave relay rather than telephone lines.

● Telephones that are smaller, lighter, and more attractive, ranging from the Princess of recent years to the just-introduced Trimline, which incorporates the receiver, transmitter, and dial in a light handpiece.

Telephones with brains. Regardless of the shape your telephone takes, the services you get depend largely on what kind of equipment the phone company installs at your local exchange. An experiment is underway in one small residential town to determine what new services users actually want—the services you will have in years to come. Residents of Succasunna, N.J., have No. 1 ESS (for Electronic Switching System), a new kind of computer-controlled telephone exchange.

Before No. 1 ESS went into service there, I was invited to look at its prototype undergoing tests at Bell Telephone's laboratory at Holmdel, N.J.

What can ESS do? If you're going to a friend's home for the day, you just pick up your phone and dial your friend's number along with a special code meaning "trans-

Continued

Urheberrechtlich geschütztes Material

The Picturephone, the TV phone of the future, is already providing service between New York, Chicago, and Washington. Here, a PS editor in New York confers with Boating Editor Jim Roe in Chicago.

Master control at No. 1 ESS exchange, Succasunna, N.J. Machine prints out operating data on teletype, instructs technicians when repairs are needed.

Intricate wiring of No. 1 ESS is on plug-in computer-type circuit boards, like this one, containing transistors, resistors, capacitors, other components.

Changing operation of No. 1 ESS is as simple as changing a memory card. These racks contain banks of cards, each with instructions for handling calls.

fer." Any incoming calls will automatically be switched to your friend's phone. Conference calls are just as simple: Dial the first party and have him stay on the line while you dial one or two others using a special code and their numbers.

Another ESS service is called "camp-on." If you're calling a number and get a busy signal, you just dial a code and the number. The electronic exchange dials your party as soon as he hangs up, and calls you back. There's also another kind of camp-on service that puts a short beep on your line while you're talking to let you know someone else is trying to reach you. You can switch to the new call, tell him to hold on or call back, and then go back to your original conversation.

Succasunna's switchover. On May 30 at 12:01 a.m., No. 1 ESS took over the job of switching telephone calls for Succasunna's 5,000 subscribers. Most of them noticed nothing out of the ordinary, except for the 200 volunteers who were selected to test the first space-age telephone service.

I talked to two of Succasunna's volunteer phone testers, Mayor Louis Nero and Town Attorney Alex Lozorisak, both of whom have the new services in their homes and offices. Mayor Nero has found many uses for ESS magic, including three-way conversations between Succasunna's town hall, his home, and the attorney's office.

"One thing about that transfer business," he said, "is that you've got to remember to have your calls put back on your phone when you get home. I had mine transferred to a neighbor's house, and the exchange kept right on transferring them. My neighbor kept telling everyone who called that they had dialed the wrong number, and they kept calling back to deny it."

Of all the tricks that can be performed by ESS, however, the one that is proving most popular in Succasunna is something called "abbreviated dialing."

"What do you like best about this?" I asked Lozorisak, indicating the new Touch-Tone phone on his desk.

"Unquestionably the abbreviated dialing," he told me. He showed me a list of names—calls he makes almost daily. Each name was neatly numbered—1, 2, 3, 4, and so on, each with a star in front of it. With the new pushbutton phones, a single button with a star takes the place of the special "11" dialing prefix—a code that in-

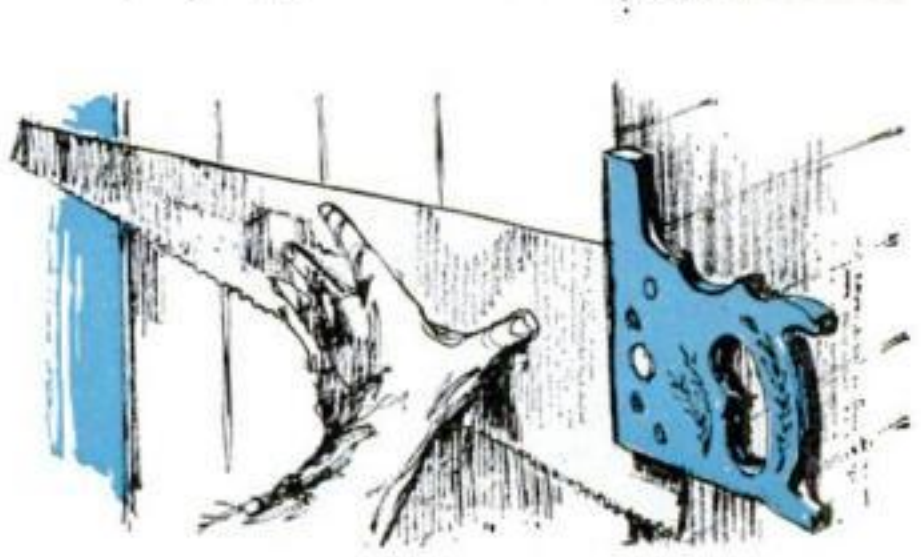
[*Continued on page 182*]

Urheberrechtlich geschütztes Material

"I'd like to see them make..."

Hunters' transistor radios for transmitting timed signals from parked cars. Then with a pocket radio compass you could "home in" on your car in the woods.—*R. E. Steck, Stratford, Conn.*

A cold-country rotor antenna with a built-in heater. Snow, rain, grease, and oil wouldn't freeze, locking such an antenna in one position all winter.—*Ronald Aigner, Kohler, Wis.*



Dual-duty handsaws with the leading edge of the handle metal-edged and set 90 degrees to the back of the saw for use as a quick and handy square.—*R. L. Pirani, Worcester, Mass.*

Foldaway trash cans for more compact storage in seasons when they're not in use. Why not make a wire basket patterned after a collapsible drinking cup?—*Frank Arnald, Boston.*

Instant-postcard cameras that turn out card-size Polaroid color-film prints. You could snap your own vacation scenes, make holiday and birthday cards.—*John Hoepfer, Las Vegas.*

Everyone has his own pet idea of a gadget that he would like to see in general use. What's yours? We will pay $5 for each one published. Please use Government postcards only. Send to ILTS Editor, Popular Science, 355 Lexington Ave., NYC 10017. Write your name and address clearly. Contributions cannot be acknowledged or returned.

Urheberrechtlich geschütztes Material

How Much of Your

Getting one of the new glamor jobs can turn out to be a mixed blessing nowadays—if you can't take what you've learned with you

By HERBERT SHULDINER

Do you know too much to change jobs? Amazingly, many people do. Skilled hands—from mechanics to Ph.D.s—are increasingly encountering trouble in switching to better-paying jobs because they know too much of their company's business. Consider some recent incidents reflecting this new obstacle to getting ahead:

A chemist working on a secret process for making a paint pigment resigned his job and went to work for a competitor. His former employer got a court injunction that barred him from helping anyone to make the same pigment. He has not been able to work in his specialized field since.

An engineer with a leading role in the design of the Mercury space suit quit his job and joined the space-suit division of a competing company. The first company unsuccessfully tried to stop him from working on space suits for anyone else, fearing leakage of its secret processes. The man was allowed to work at his specialty, after a long court battle, but was sternly warned by the judge not to reveal his confidential information.

Eight employees of a company manufacturing computers quit to form their own data-processing-equipment firm last year. Their former employer sued to bar them from using manufacturing know-how they allegedly picked up while in the company's employ. They're still in business, but the case is still pending in court.

These are just a few of dozens of cases alleging trade-secret violations by former employees that have been thrown into the courts recently. R. G. Jeter, vice-president of the B. F. Goodrich Co., has called it a "big problem" and says "the protection of trade secrets, particularly in cases involving the employer-employee relationship, frequently involves a rather delicate and difficult balancing of equities."

Safeguarding trade secrets. An increasing number of firms are requiring their workers to sign agreements not to use special know-how acquired in their jobs for any other business. Some firms even include a clause that prevents you from working for anyone else in the same field for a specified period (usually one to three years) should you leave their employment. This could keep you from changing jobs, unless you go into an entirely new area. But the courts have been reluctant to enforce these obligations on employees for more than short periods.

Patent-assignment waivers are required by many firms as a condition of employment. Anything you patent while you work for the company must be assigned to them for a nominal fee. Rep. George E. Brown Jr. of California says there is a "great need for clarifying legislation to determine the rights of the employed inventor." And he has introduced a bill that would outlaw blanket patent assignments.

In addition, when you leave for another job, companies nowadays try to keep you from taking any notes, records, or other data you've accumulated with you, not even—when business reasons are compelling enough—what you have accumulated in your head.

Many companies conduct exit interviews for departing employees who have worked on secret products or processes. Workers planning to take a job with a competitor are bluntly told what they must not divulge to their new firm. Sometimes court action is taken to enjoin an employee from going to a competing company.

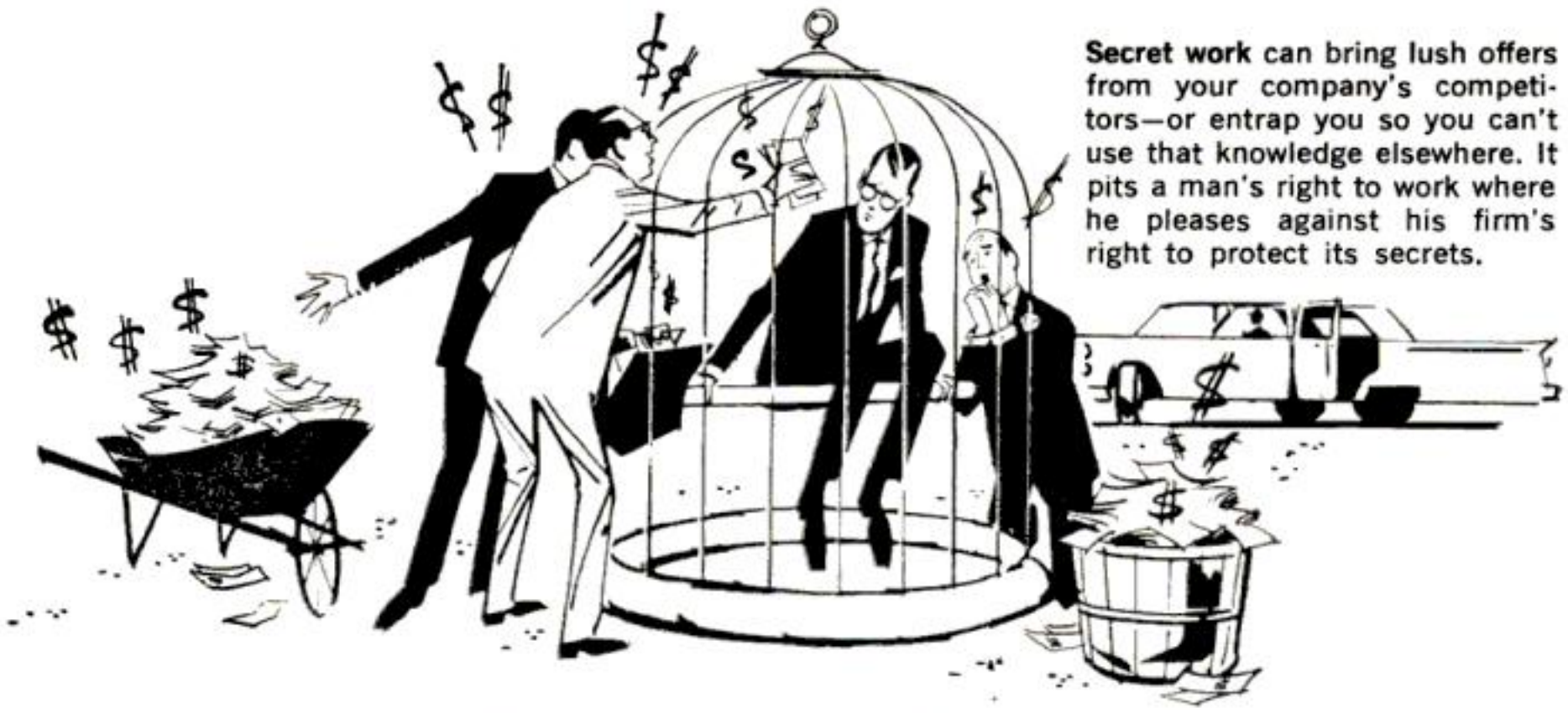
Continued

Urheberrechtlich geschütztes Material

Job Belongs to You?

What you bring to a job—education, intelligence, problem-solving ability—belongs to you. What you pick up there—company secrets, know-how—probably doesn't

Urheberrechtlich geschütztes Material



Secret work can bring lush offers from your company's competitors—or entrap you so you can't use that knowledge elsewhere. It pits a man's right to work where he pleases against his firm's right to protect its secrets.

Here the courts are faced with a real dilemma. How do you prevent the unfair loss of trade secrets, developed with risk, money, and sweat? At the same time, how do you keep an employee from being entrapped and chained in such a way that he will not be able to use his skills and knowledge to make a living?

Who owns the knowledge in your head? Legal experts say that what you pick up on your own is yours to use wherever you wish. But when you discover something you were *hired* to do, that belongs to the company. The rub is how to separate what you learned on your own from what you picked up on the job. There are times when it is impossible to separate job know-how from a normal accumulation of skills.

American industry spends about $13 billion every year on research and development. A new discovery can be extremely profitable to a company, giving it an advantage that may take its competitors years to meet independently.

But increased emphasis on research and development has made our technical society highly mobile. R & D men move around a lot, often carrying away trade secrets. This is stimulated by the pressure of government on business. Some companies are forced to expand rapidly to fill a new contract while others have to cut back production and lay off men—even those who might have learned secrets that could aid competitors.

Behind the eight ball. Just who is affected by this situation?

- Mechanics and other workers who acquire special skills and trade secrets by operating or servicing secret machinery.
- Draftsmen who work on new designs.
- Salesmen who acquire information to help them sell products.
- White-collar workers who learn company secrets by handling the paperwork.

But the men most subjected to this problem when they move from job to job are those in experimental or basic research.

Rarely does one man know everything about a product. Usually one man knows only fragments of the whole. But sometimes that could be the fragment a competing company needs to complement its own research efforts.

Patents aren't the answer to this problem. Sometimes patenting a product is an invitation to competitors to pirate it. Many valuable trade secrets aren't even patentable. This includes development of manufacturing processes and know-how.

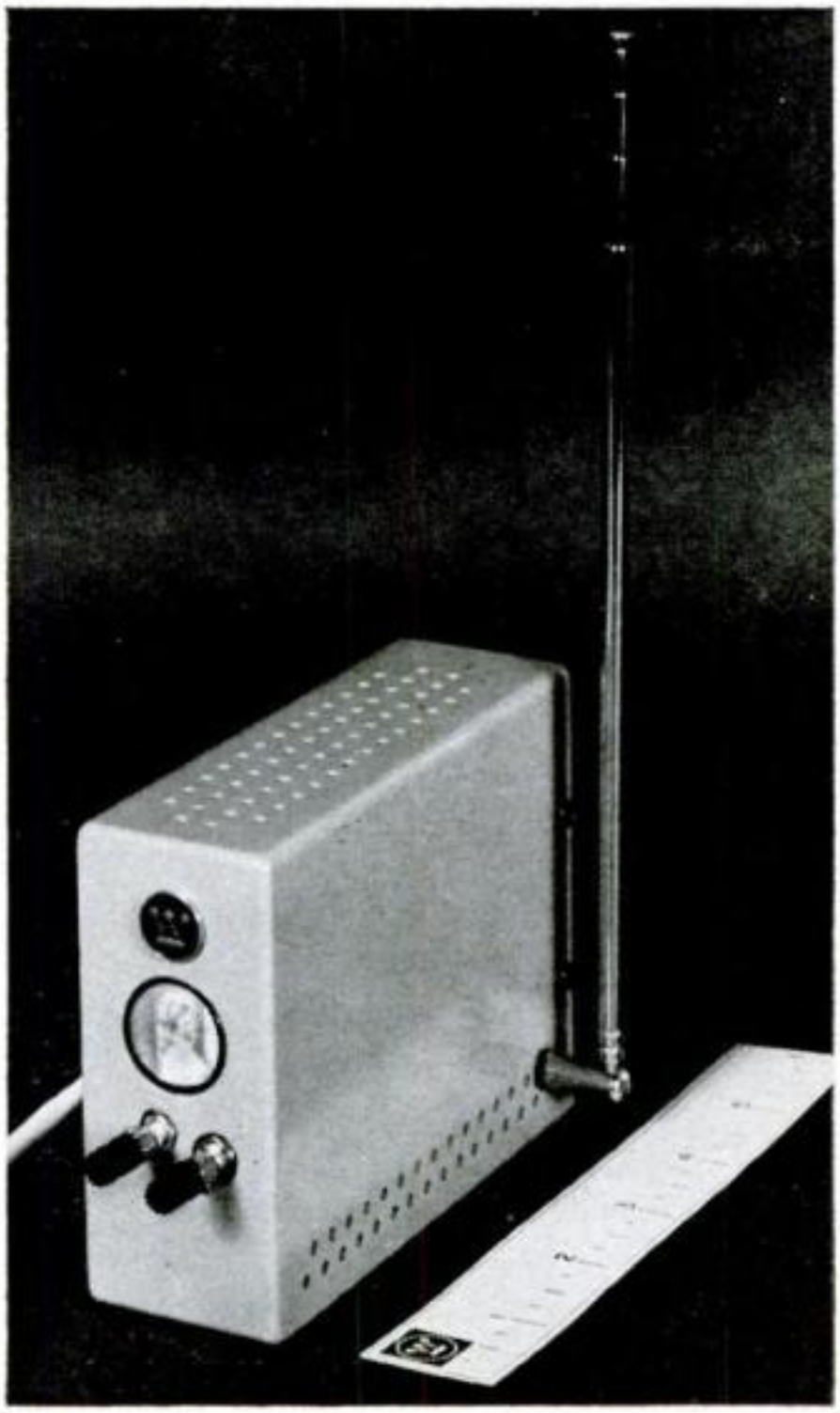
With few exceptions, established businesses will not attempt to hire a man just for his knowledge of trade secrets. There are some firms, though, who make a profitable practice of "milking" skilled people for their know-how. Before a worker jumps, he should be aware that such firms also have a reputation for being ruthless with the people they exploit.

A reputable firm will frequently warn you not to disclose any of your previous employer's confidential information you possess when they hire you.

The man who builds a better mousetrap may find that he's the one who gets caught in this new type of competition.

What can you do to keep yourself untrapped? Sell *what you own* to a new employer—your skills and ability to get the job done. Don't try to cash in on what you don't own—a company's secrets. PS

Urheberrechtlich geschütztes Material



TV so small you can hardly see it

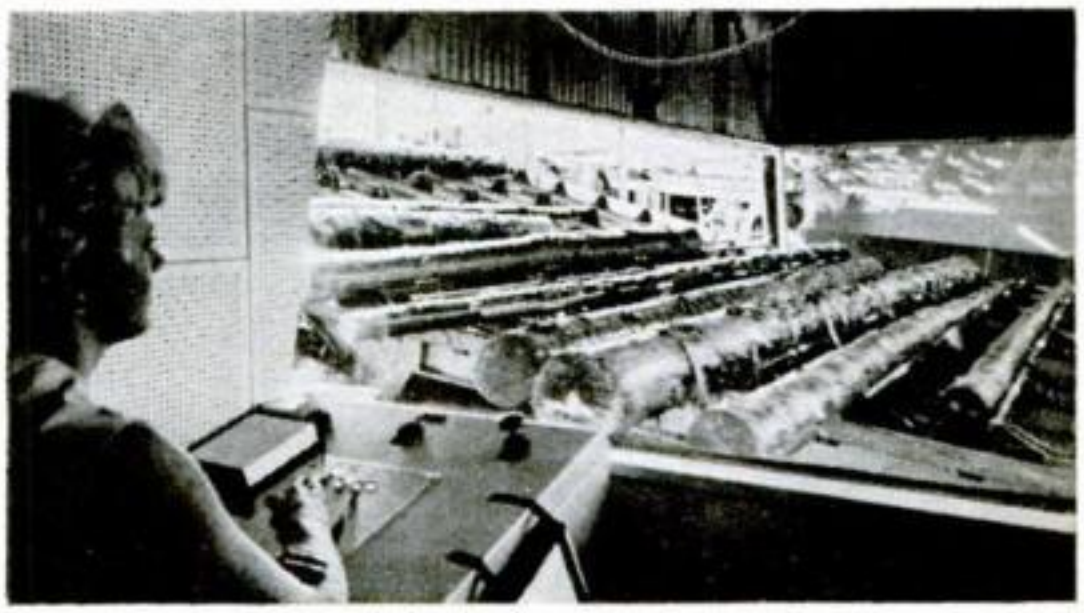
Here's a result of Westinghouse engineers' work with microminiature circuitry and components: the world's tiniest TV set, reported in Science Newsfront [PS, Nov.]. The ultimate in compact receivers stands a bare 3½ inches in height and is hardly 4½ inches long. Its picture tube is only an inch in diameter—about the size of a quarter. You'll not be able to buy one. It's being tested for application in military and space electronic micro circuits.

Mechanical valet presses trousers

An automatically adjusting pressing plate on this suit hanger grips the cuffs of your trousers firmly to allow for any adjustment, stretches the trousers gently to work out wrinkles, and has them ready for you the next morning with a newly pressed look. A coat hanger at the back drapes the jacket for an overnight airing. Viscount of England Pressomatic Valet sells for about $85 at Saks Fifth Ave., New York City, and Neiman-Marcus, Dallas, Tex.

Logging now women's work

Women more accustomed to pushing the keys of a typewriter now sort logs in a newly mechanized Swedish lumber mill. Instead of rolling floating logs with the aid of pike poles as men on the job used to do, they press buttons on an electronic computer. Logs pass by their stations on conveyors, dropping into the proper channels when the appropriate button is punched.



Urheberrechtlich geschütztes Material

Rooftop cameras monitored by policemen and plain-clothes "commandos" with walkie-talkies help fight lawlessness

Television Eyes Catch

By **DAVID SCOTT** / *PS European Editor*

A fight started on a busy street corner in Liverpool, Britain's tough, hustling seaport. A knot of onlookers quickly formed, and police on the beat hurried over to investigate. After a few minutes, two men squirmed out of the throng, strolled down the street, and suddenly darted into the doorway of a small jewelry store.

High overhead, a rooftop TV camera, controlled by a policeman in a room below, focused on the fight, then drew a bead with a powerful zoom lens on the two men walking away. The policeman recognized them as known criminals and quickly notified headquarters by radio. Minutes later, the pair was apprehended jimmying the door of the jewelry store. The fight had been a diversion to distract the police.

When Chief Constable Herbert Balmer took over the force in 1964, the number of reported thefts and assaults in Liverpool's business district had reached 225 a week—a 100-percent increase in two years. The rate of detection had dropped to 18 percent, and the police were 540 men short of normal strength. To combat the problem, Balmer introduced TV surveillance to deter crime and innocent-looking police "commando" teams to roam the streets.

The cameras are set up on high buildings where they can scan the streets below. Alternately, they may be hidden behind signs, camouflaged as floodlights or traffic-control equipment. Operators with monitor screens handle remote pan, tilt, and focus controls. They are in radio contact with headquarters, prowl cars, and commandos.

The commandos are an integral part of the scheme. These are 60 young men and

Urheberrechtlich geschütztes Material

Criminals in the Act

women who carry walkie-talkies and work in various guises as window-shoppers, courting couples, or idlers.

Balmer has introduced several other electronic tricks in his fight to clean up Liverpool. One is tiny "bleep" transmitters attached to the doors of theft-prone premises that radio location-coded signals in the event of a break-in.

His get-tough plan—which was widely publicized in advance—has worked beyond all hopes. In the first week it was in operation, the number of crimes in the area fell to 140 and the detection rate shot up to 46 percent. Since then, the weekly crime rate has dropped to 105—better than 54 percent.

Future plans call for extended TV surveillance of the city, with some cameras controlled from police headquarters. Balmer is convinced the best deterrent to crime is the likelihood of being caught.

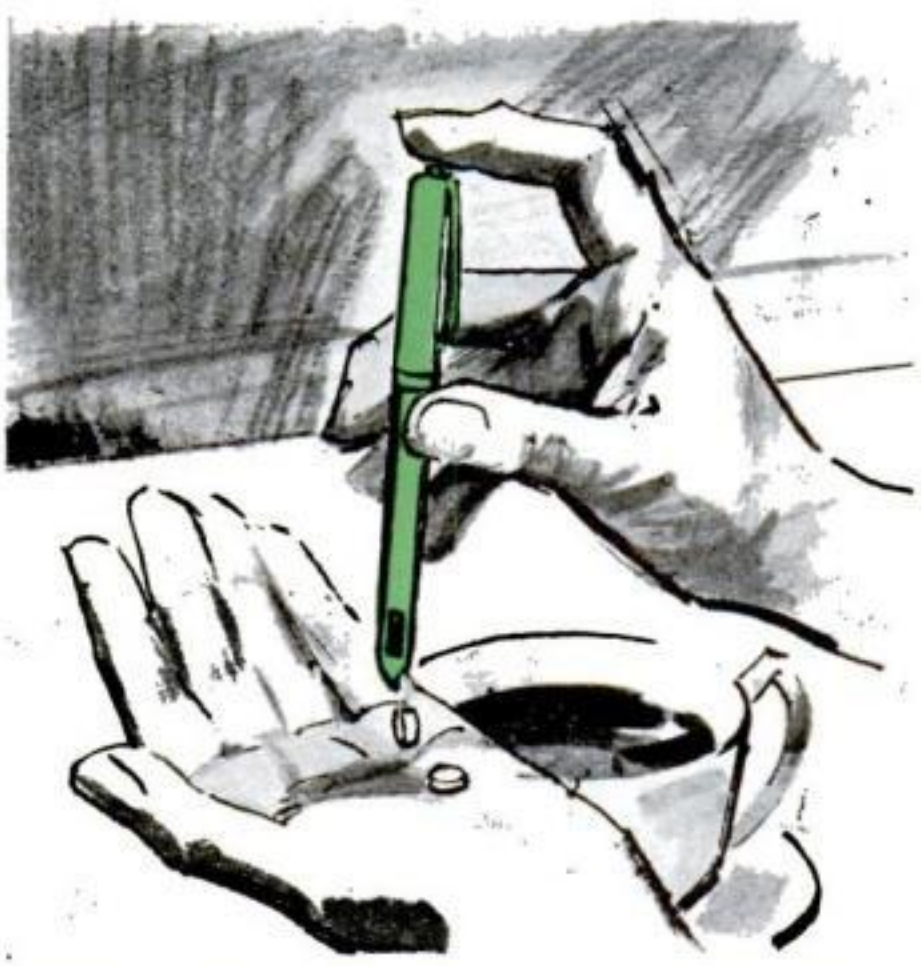
A commando gets strapped into his walkie-talkie before starting on plain-clothes patrol. His beat, the section of Liverpool now under television surveillance, includes the big city's tough dockland area.

Urheberrechtlich geschütztes Material

New Ideas from the Inventors

Hub mounts extra wheel. An ordinary car or small truck might maneuver more easily on difficult terrain, or carry extra-heavy loads, with this recently patented dual-wheel mount. Fastened under the lugs that hold the regular wheel, the cast-metal mount would support a second wheel in alignment with the first to increase traction and load-carrying capacity.

Clock without hands. You could tell time on this clock in a bright or dim light—or in no light at all. Instead of sweeping two hands around the dial, its mechanism would move a commutator brush over a series of electrical contacts. It would light, in turn, on the hour, 12 neon lamps in an inner circle. An outer circle of minute-marking lamps would also light in turn, to provide a time change every five minutes.



Pocket "pen" dispenses pills one at a time. People who carry medical tablets, vitamin capsules, or a pill-shaped sugar substitute might find a dispenser like this one more convenient and less conspicuous. Downward pressure on the spring plunger would retract a gate to release one tablet. The inexpensive plastic cartridge might also be used as a throwaway package for outdated or no longer needed medication.

Urheberrechtlich geschütztes Material

Exhaust hose helps free car. To utilize the exhaust heat to free a car stuck in snow or ice, or to defrost windows, one inventor suggests an insulated hose fitted with funnels at both ends. One funnel would slip over the tail pipe, the other would focus the heat. The hose could also vent exhaust gases outside a garage while you worked on your car engine inside.

Christmas angel douses tree fires. If a Christmas tree caught fire, the flared skirt of this ornament-shaped fire extinguisher would aim a spray of liquid or foam down and outward along the branches. A heat-responsive valve would start the spray, which could be contained in the ornament or piped to it from a pressure-tank hidden among the tree's branches.

Motor shuttles practice target. A small battery-powered motor in this target-towing device would keep the bull's-eye moving while you improved your aim. The target would ride from side to side on two supporting cables strung from trees or posts. Bumper pads at each end would trip a switch and start the target traveling in the opposite direction.

The following patents have been issued on these inventions: **Wheel mount**—*No. 3,039,825 to S. P. Clark, Miami, Fla.;* **Handless clock**—*No. 3,145,526 to J. J. Kroon, Ferndale, Mich.;* **Pill pen**—*No. 3,166,216 to J. S. Guarr, Topeka, Kans.;* **Exhaust hose**—*No. 3,151,613 to H. H. Howard, New Rochelle, N.Y.;* **Tree fire extinguisher**—*No. 3,171,493 to B. W. Barr, Stoney Creek, Ontario, Can.;* **Target tow**—*No. 3,140,874 to R. P. Jensen and D. W. Sackett, Owatonna, Minn.*

Copies of patents may be ordered, by number, from the Commissioner of Patents, Washington, D.C. 20231, at 50 cents each. To write to an inventor, if the address above is insufficient, address him (by name and patent number) in care of the Commissioner of Patents.

Urheberrechtlich geschütztes Material

Capsules showering from the sky into the sea, for recovery by paradivers, bring back motion-picture films that reveal the full story of our latest launch vehicles' performance during flight

By Dr. Wernher von Braun

Director of NASA's George C. Marshall Space Flight Center, Huntsville, Ala.

Ignition of second-stage engines of a Saturn I is shown in photo, made and brought back by capsule.

Rocket-Riding Cameras

On the morning of January 29, 1964, our fifth Saturn I roared into orbit from Pad 37-B at Cape Kennedy, Fla. Less than an hour after takeoff, the first of eight motion-picture-camera capsules, ejected from the first stage after burnout, were recovered from the sea some 550 miles downrange. Paradivers dropped from planes into the rough water, inflated their rafts, and hauled five of the capsules aboard. Two capsules that could not be retrieved before dark, due to high winds and waves up to 10 feet, were salvaged by a recovery ship guided by flares from the aircraft.

When the seventh Saturn I was launched on September 18, 1964, Hurricane Gladys kicked up 15-foot waves in the capsules' impact area and all attempts to recover them were canceled. However, on November 9, two of the capsules were discovered by beachcombers. One had washed ashore on San Salvador Island, the other on Eleuthera. A third capsule was recovered last April by a swimmer off San Salvador. Despite the battering the capsules took, most of the recovered films furnished useful information.

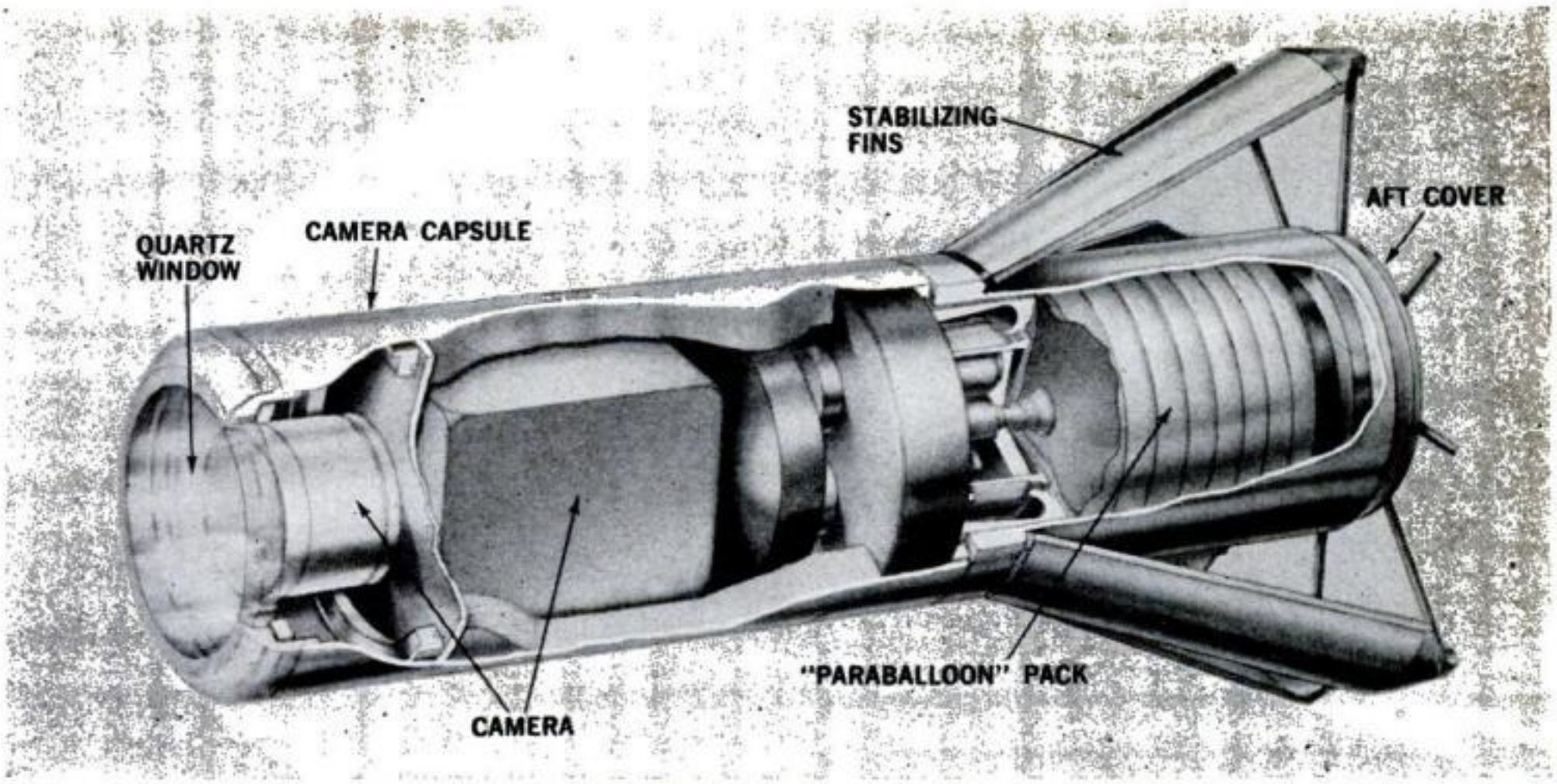
Author is awarded Pioneer of Windrose chain for his initiative in air and space, during a recent visit to Germany.

Because camera capsules enable a designer actually to see what happens in flight, they are proving invaluable in developing rocket-launch vehicles. They offer important advantages over other means, such as telemetry, of reporting a rocket's behavior.

The ejectable motion-picture-camera capsule for the Saturn was developed and tested by scientists and engineers of NASA's Marshall Space Flight Center, supported by the Cook Technological Center in Chicago. The capsule weighs about 60 pounds, has a diameter of 7¾ inches, and is 28½ inches long. There are two different types:

The so-called Model A capsule serves for "direct viewing." It films events visible from the camera's position, before its ejection. At its forward end is a quartz view-

Urheberrechtlich geschütztes Material



Design of recoverable camera capsule, 28½ inches long, is shown in cutaway view. This direct-viewing model has quartz window to protect its camera from heat of high-speed flight through the atmosphere.

Show How Boosters Behave

ing window that protects the camera lens from aerodynamic heating. Four such direct-viewing cameras, mounted on the front end of the first stage and looking forward, photograph the second stage's igniting and thrusting away from the first one.

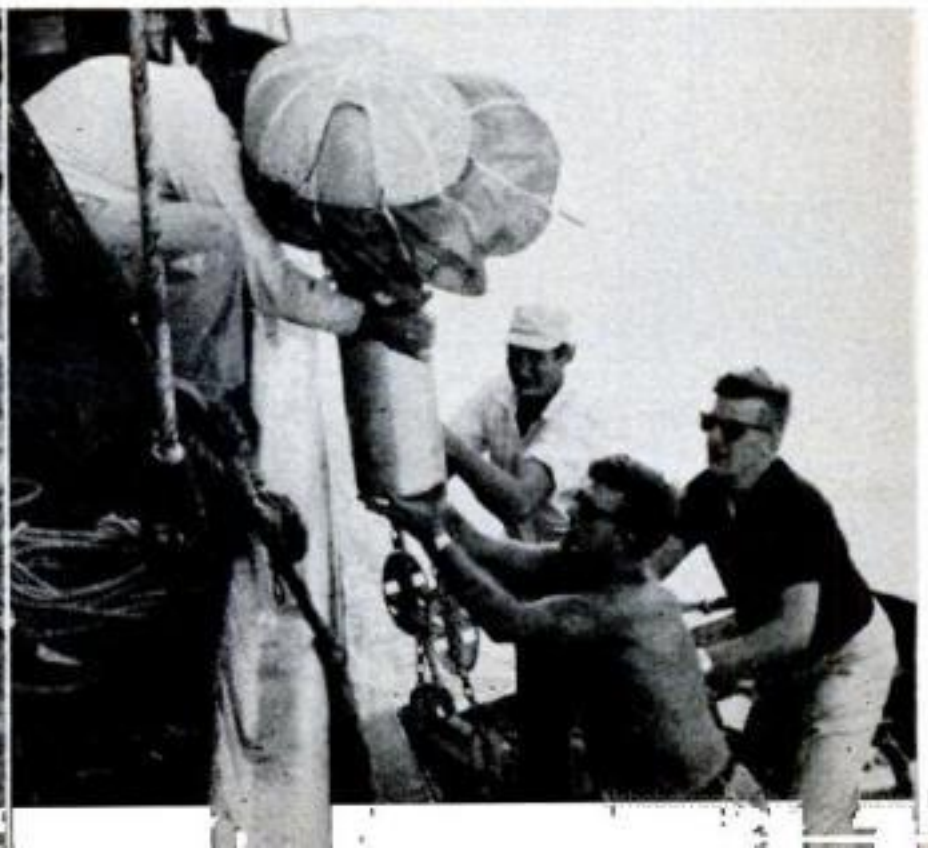
The Model B capsule employs "indirect viewing." The camera lens looks into a "fiber-optics bundle"—to all intents, a flexible metallic hose that permits optical images to be piped around corners. The opposite end of the fiber-optics bundle may be connected, for instance, to the upper bulkhead of the liquid-oxygen tank. The camera capsule then looks into the pressurized tank, just as if peering into a container whose lid has been removed. A special incandescent lamp provides enough light to film events inside the tank.

Essentially the fiber-optics bundle consists of several thousand glass fibers, each

[Continued on page 184]

Paradiver retrieves capsule bobbing in rough sea after its ejection from our fifth Saturn I rocket.

Salvaged capsule, holding precious films of the big rocket's behavior, is handed aboard recovery ship.



JACK-IN-THE-BOX LIGHTHOUSE becomes

Resembling a giant wedding-cake afloat, the telescoped structure of the world's tallest lighthouse was recently towed to a site in the Irish Sea, nine miles off Dublin, and sunk to the bottom. Then, like a jack-in-the-box, its tower rose 110 feet above the water. Visible for 18 miles, its two-million-candlepower lamp now replaces a former lightship there.

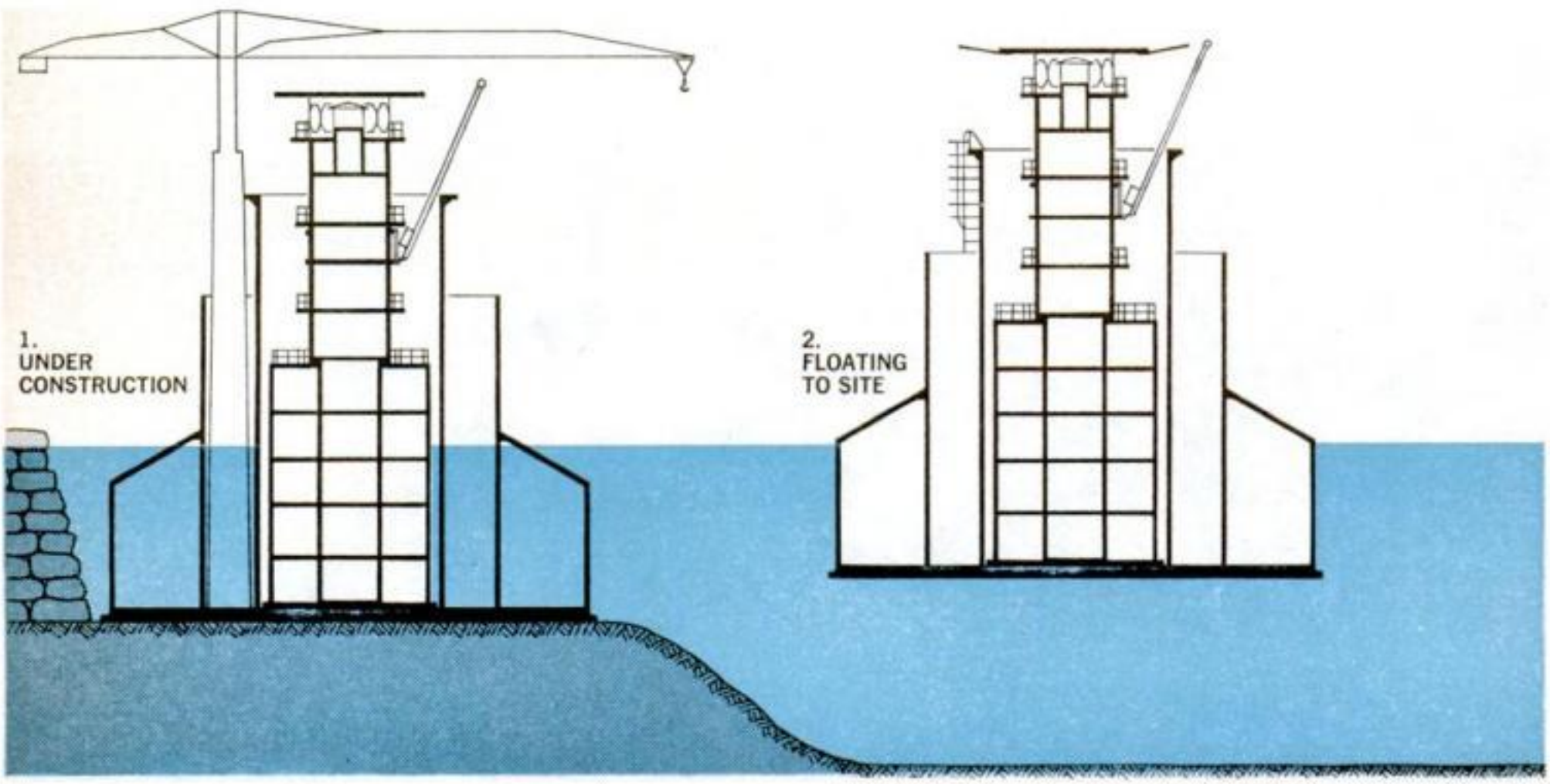
The new lighthouse, built in a sheltered harbor near Dublin, applies a Swedish-patented design. Its hollow 104-foot-diameter base of concrete has three concentric walls. Radial partitions divide the middle and outer spaces into 24 watertight compartments. During construction, these were flooded, while the tower was built and completely equipped in the dry center space.

Pumping the water out of the compartments gave the drumlike base enough buoyancy to float the whole 6,700-ton lighthouse, for towing it to its site. Then reflooding them sank the structure to its prepared foundation on the Kish sandbank, 57 feet below mean low tide. Pumped into the base, 18,000 tons of sand provided enough ballast to withstand 45-foot waves.

When flood valves admitted the sea to the central cylinder, the buoyant tower floated upward, to within three feet of its final height. Twelve jacks and cables raised it the rest of the way. Concrete, poured in the ringlike gap, cemented it in position; and sand filled the empty space below it.

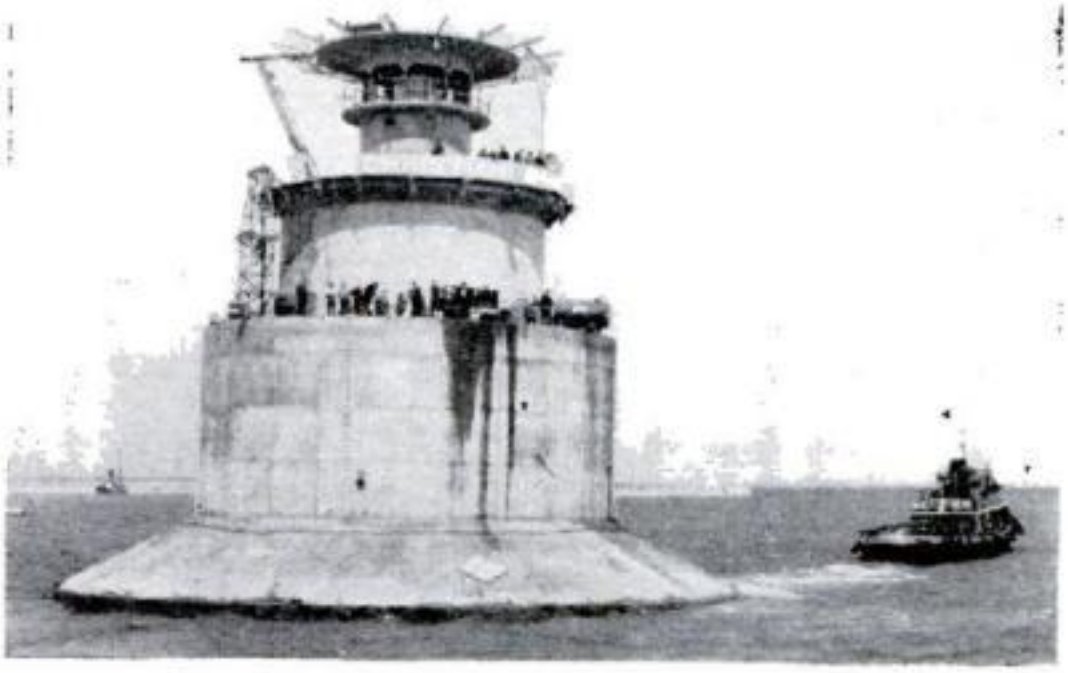
A heliport atop the $850,000 lighthouse helps link it with shore. Electronic gear includes a "racon" responder beacon that reflects a coded blip back to a searching radar, positively identifying the lighthouse. The crew of three, quartered on 35-foot-diameter lower floors, have private cabins, a lounge, an electric kitchen, and a laundry. A 50-foot crane, traveling full-circle around the tower, brings supplies and fuel aboard from ships, which may be moored in any position.—*David Scott*.

Built in harbor, lighthouse was floated to site and sunk—and then

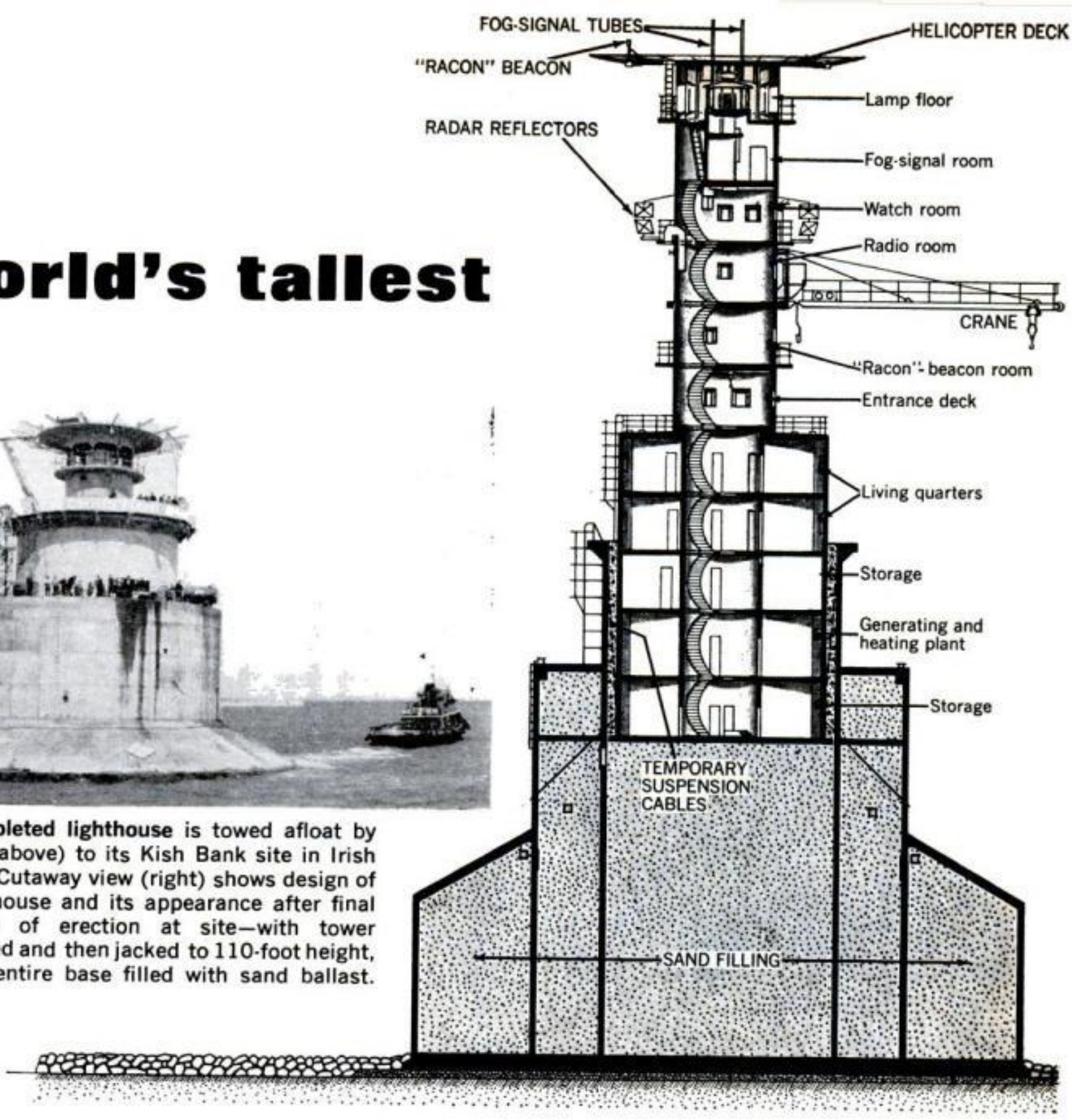


Urheberrechtlich geschütztes Material

world's tallest

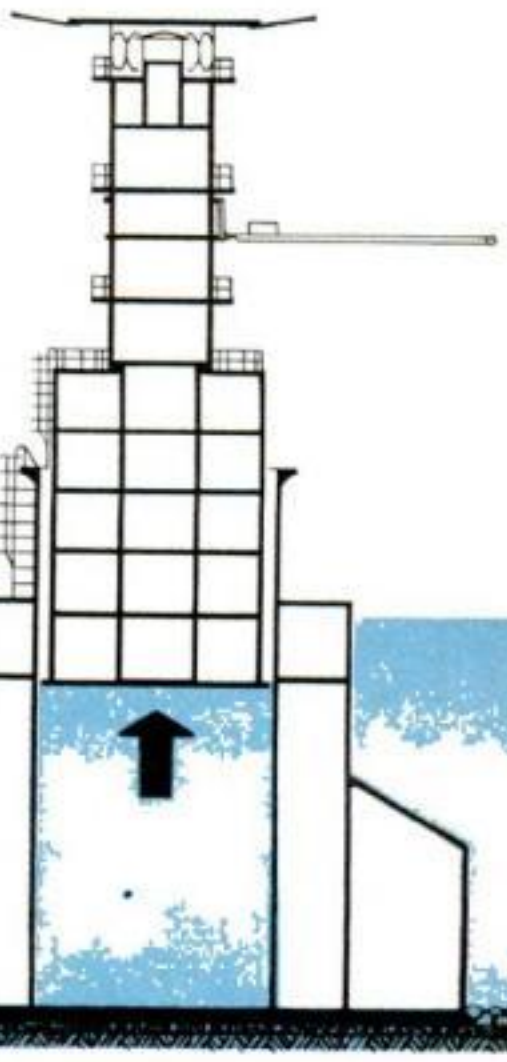


Completed lighthouse is towed afloat by tug (above) to its Kish Bank site in Irish Sea. Cutaway view (right) shows design of lighthouse and its appearance after final stage of erection at site—with tower floated and then jacked to 110-foot height, and entire base filled with sand ballast.



extended to full height

During construction of lighthouse, water flooded radial compartments of base (1). By pumping it out, lighthouse was floated for towing (2). Reflooding compartments sank it at site (3). Then buoyant tower was lifted almost all way by admitting sea beneath it (4), and jacks and cables finished job.



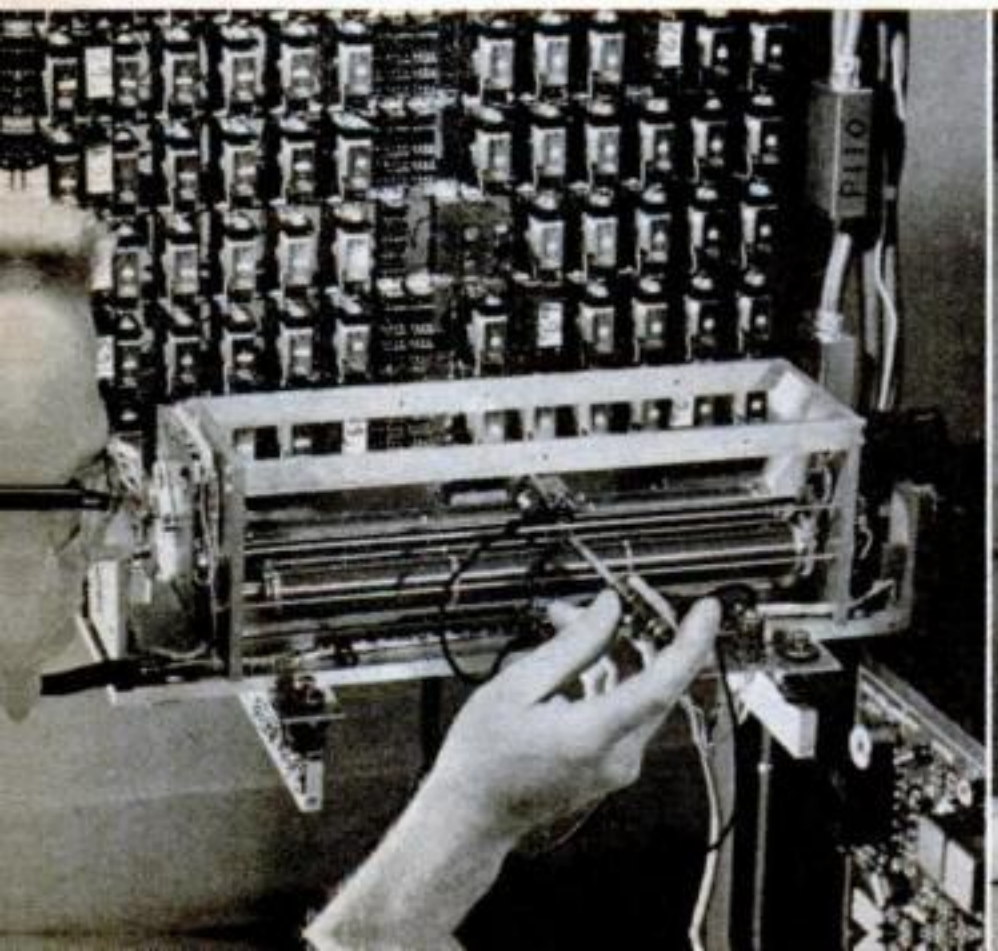
Urheberrechtlich geschütztes Material

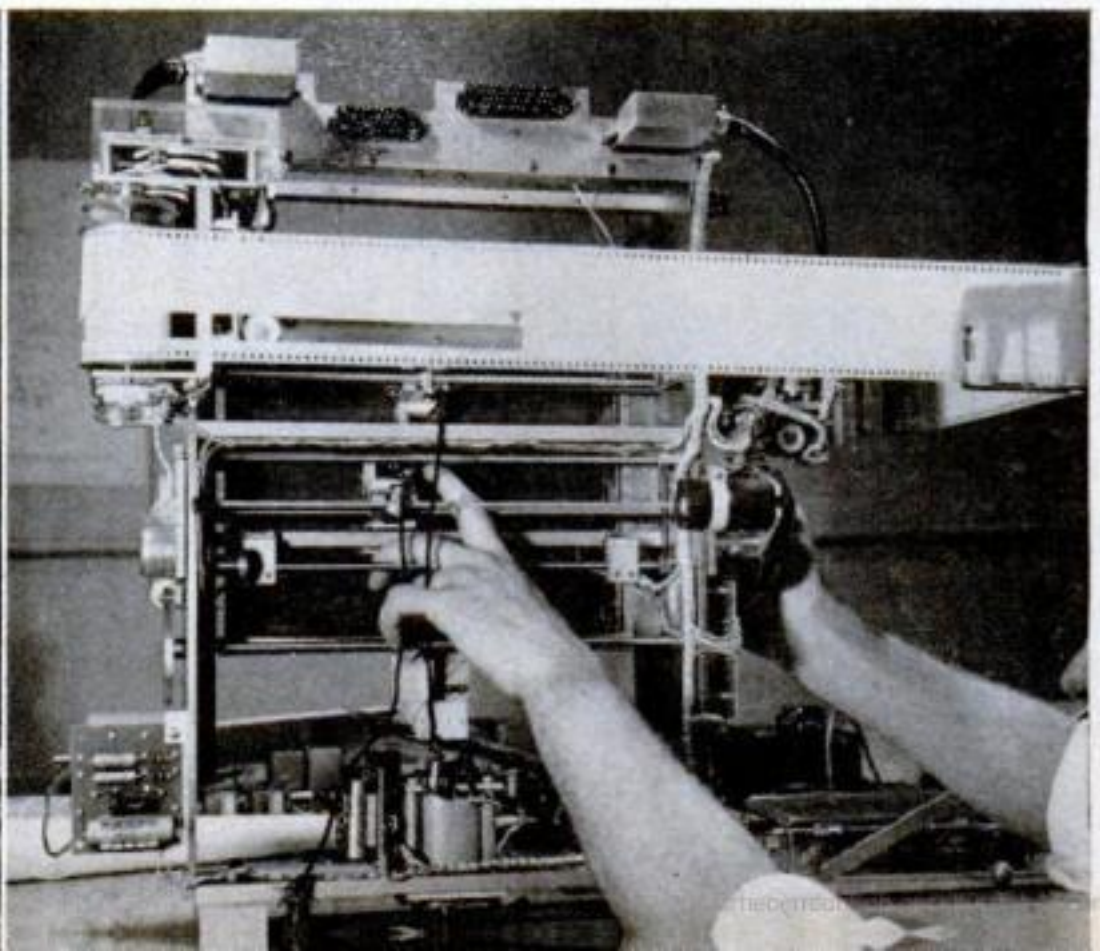
Young lady pauses for thought as robot typewriter shows a picture of a sailboat, points

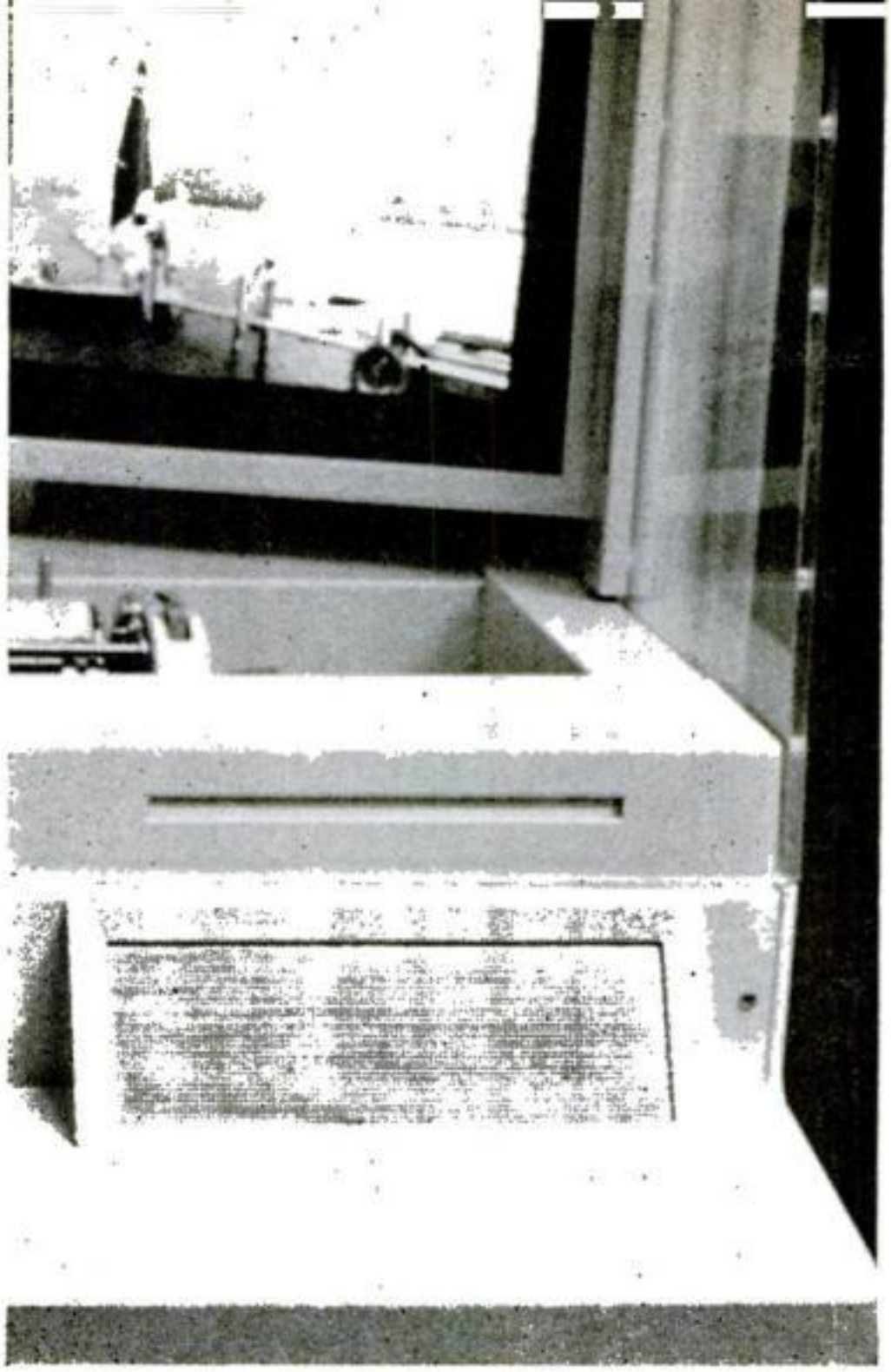
How They Make a Typewriter

Open panel reveals circuitry—banks of relays, timers, and other components—that make up typewriter "brain." In frame at center is the phonograph cylinder with character pronunciations recorded on it.

Finger points to pickup head that reproduces sound, data, recorded on back of programing card. A red pointer is printed on white film strip; sprockets advance it from letter to letter as child types.





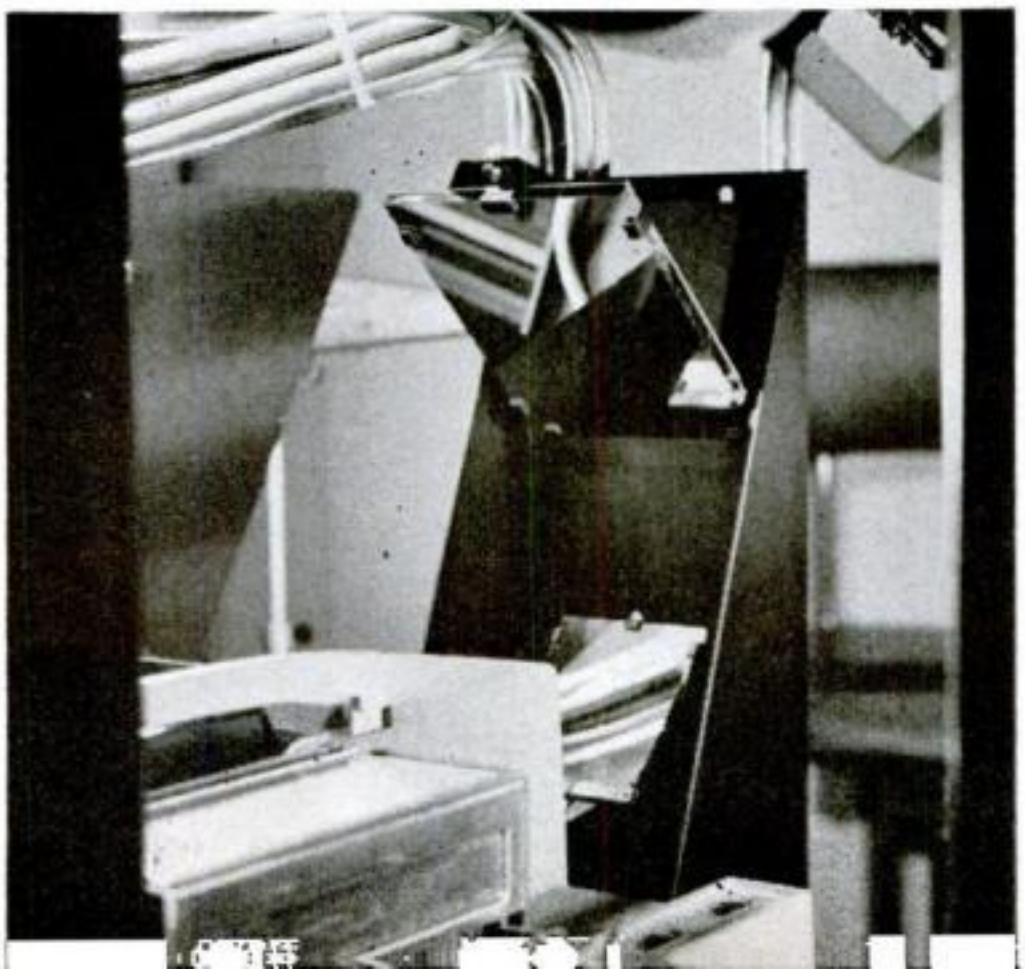


out each letter, and asks her to type the word.

Talk

By W. STEVENSON BACON

Automatic slide projector, cued by signals recorded on programing card, faces rear of the machine. The two mirrors seen below reflect image onto the frosted-glass screen seen in top photo.



Actually a robot with a computer brain, this new machine types, talks in six languages, shows slides, and records voices

The typewriter that talks promises to spark a revolution in the way our kids learn to read and write. Reams of copy have been written about the teaching wonders it performs, but there is a fascinating untold story in the ingenious conglomeration of gadgetry behind that shiny keyboard. There's not a single "scientific breakthrough" in the whole machine, but it is an inspired collection of well-known devices gathered from almost every field of technology. The way they are made to work together will tickle the tinkerer's soul in all of us.

In appearance the machine is deceptively simple. In a steel cabinet is a typewriter with colored keys, what looks like a small TV screen, and a speaker grille. Behind a transparent-plastic cover is a lighted window with a red pointer.

To get a look at it, I went to a neighborhood school in New York where an E.R.E. (Edison Responsive Environment) Learning System was being tested in use. There's something about this machine that fascinates children and adults alike—it's like a Rube Goldberg gadget come true.

I sat down at the child-height console, the machine was turned on, and a special card inserted in a slot at the top. A voice from the speaker said, "This is a boat." A color slide of a sailboat flashed onto the small screen at my right. Then the voice said, "Boat is spelled B-O-A-T. Now type the letter B." The pointer in the lighted window pointed to B, and I pressed the key.

"Very good," the voice said. "Now type O." I hesitated for a minute. "Now type O," the voice commanded again. I attempted to press letter K, but the key was blocked—as were all keys except O. Pressing the O brought the command to type the other letters, the pointer indicating each in turn.

"Excellent," said the machine. "Boat, B-O-A-T. Can you spell it out loud?"

Sheepishly, I spelled B-O-A-T, then listened as the machine reproduced my voice.

Continued

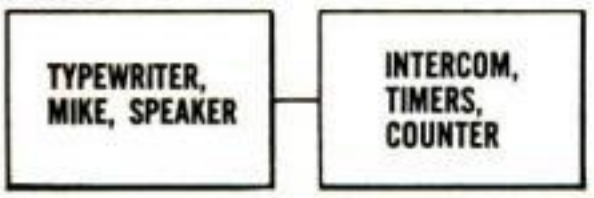
Urheberrechtlich geschütztes Material

Black magnetic coating on back of card (right) records audio and programing data. Face of the same card has the typewritten letters and words that are seen through a window at front of machine.

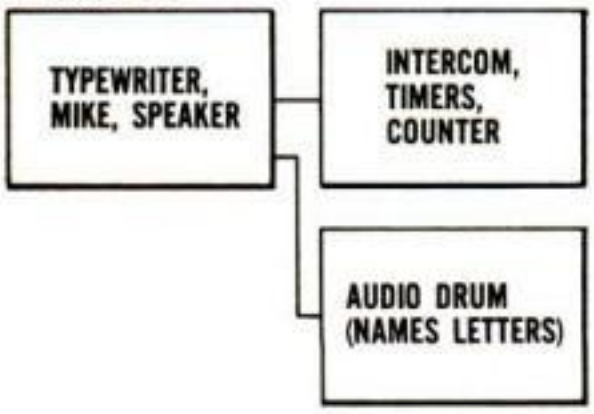
Special panel at front of typewriter opens to make programing controls accessible. Programing is done by pressing buttons ("pointer," "projector," "card voice," etc.) and recording voice as appropriate.

The flexibility of the typewriter is immense as shown by block diagrams below. The machine can be used in any of these ways, and, in addition, can be set to record the child's own voice.

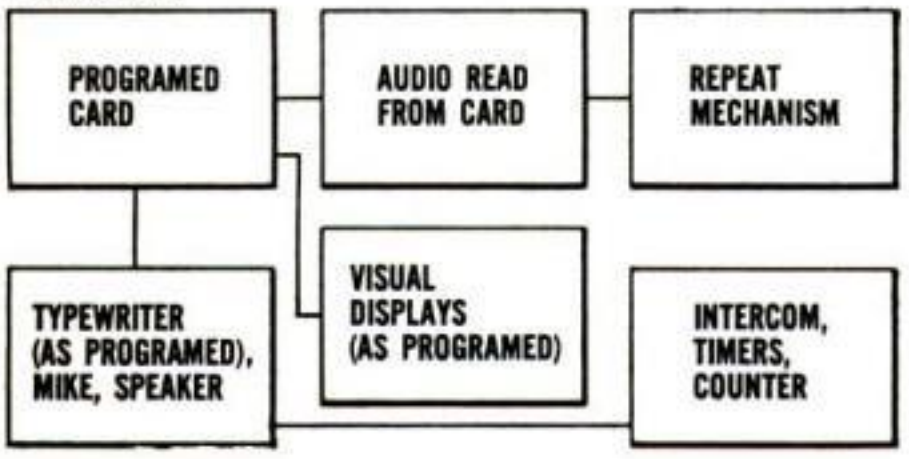
PHASE 1



PHASE 2



PHASE 3



As it went on to another word, it began to sink in: E.R.E. is the first of an amazing new breed of robots—a thoroughly competent, infinitely patient, mechanical teacher.

How it's done. The first "talking typewriters" were simply electric typewriters coupled to a phonograph. When a key was pressed, a sound-reproducing system pronounced the corresponding letter. But the latest version has lots of added features.

Although similar to electric ones used in offices, the typewriter was designed for use with a computer, and has electric switches under each key. When a letter is typed, a switch under the key closes a relay, which causes a number of things to happen. A magnetic pickup head travels on a worm gear along the length of a phonograph cylinder—much like the Edison phonograph cylinders of old, except the recording surface is magnetic, not wax.

When the pickup head reaches the sound track on the cylinder corresponding to the key pressed, a clutch engages and a motor spins the cylinder a quarter turn, allowing the head to reproduce the sound. If you type A, for example, the machine says—after an adjustable time delay to give you a chance to beat E.R.E. to it—"A," and "upper case" or "lower case."

By simply setting a switch, the machine will pronounce any letter, number, or other keyboard symbol in French, Spanish, German, Russian, or Portuguese instead of English.

Dr. Omar Khayyam Moore, an educator searching for a way to teach very young children to read and write, devised the talking typewriter. But a teacher still had to sit with a child to help him spell out words and give directions. Then engineers of the machine's maker—the McGraw Edison Co.—working under Richard Kobler and Dr. Moore, took a giant step.

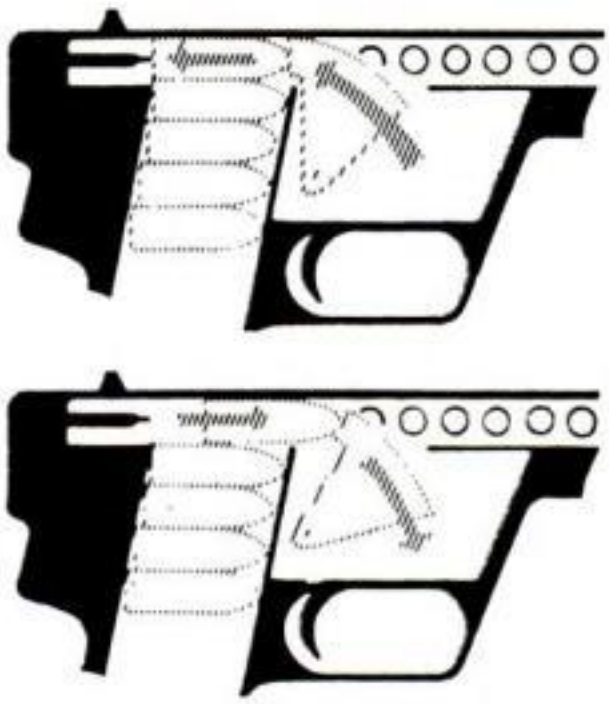
Making a machine human. They decided to eliminate the teacher. They'd put what the teacher typed, all oral instruction, and machine directions on a single unique card. The E.R.E. "card" is actually a plastic folder; in the front is inserted a sheet of paper with typewritten letters, while the back is coated with a magnetic recording material.

For each line of typewritten letters on the card's face, there are nine magnetic recording tracks across the back—one "encode" track, which directs the machine

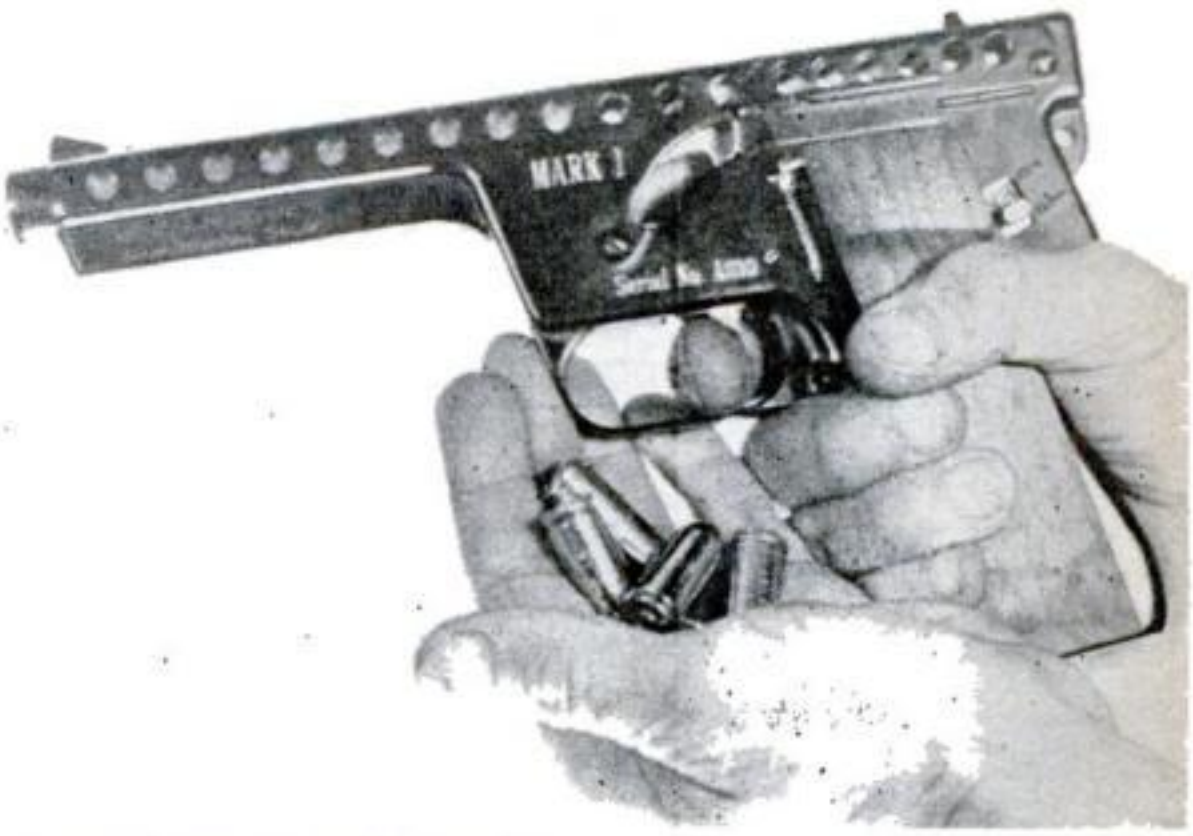
[*Continued on page 178*]

Urheberrechtlich geschütztes Material

This new semiautomatic carbine weighs only about four pounds.



Bullets are stored in the handle and are spring-fed into firing positions. Forward hammer (top drawing) drives bullet back against a fixed firing pin which sets off percussion primer (bottom drawing).



New lightweight rocket-firing handgun has no pressurized chamber. Its high-velocity ammunition is fired from a launcher barrel.

More punch than a .45: ROCKET-FIRING SMALL ARMS

Rather launch rockets than fire bullets? You can with this new line of lightweight small arms that fire miniature rockets from the smooth-bore barrels of pistols and carbines.

MBAssociates of San Ramon, Calif., makes the weapons, which are practically jamproof and have almost no recoil. The company says its guns are not a caseless-cartridge development [see "Now—a Bullet Without a Case," PS, Oct.]. The ammunition they use is high-velocity, spin-stabilized bullets, available in 7.62mm, 13mm, and 20mm (about ¼ to almost one inch in diameter). The bullets are propelled by a solid-grain fuel. When you fire the weapon, the bullet and the primer jet forward and rocket toward the target. The fuel, which is ignited by a percussion primer, burns up in about 100 milliseconds. There's nothing left in the chamber to be ejected so there can be no jamming.

The rocket travels at a speed of 1,250 feet per second and sustains an accurate long-range flight because of a gyroscopic spin stabilization created by canted ports in the aft end of the bullet. It packs a bigger punch than a .45-caliber automatic, but has about only 1/10 as much recoil in the 13mm size.

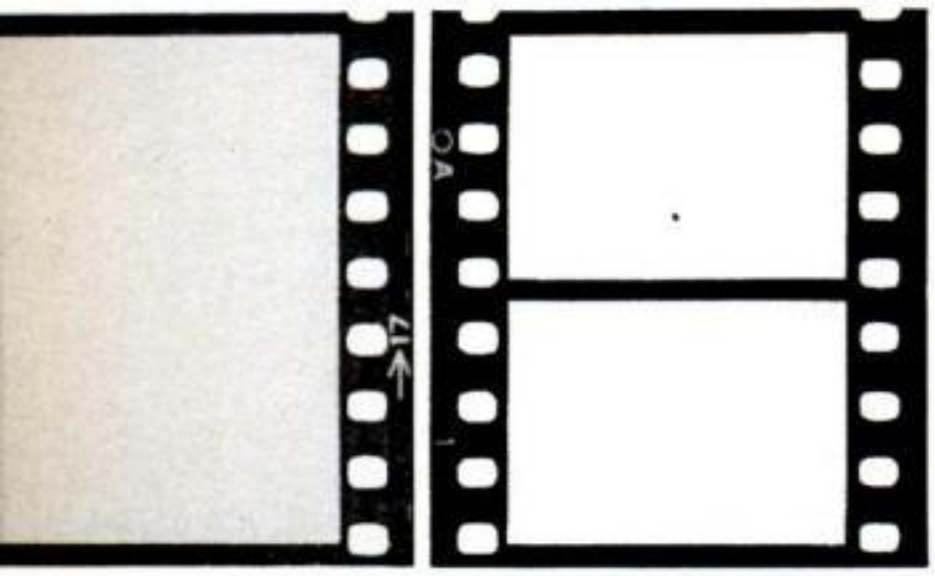
The guns are almost foolproof in operation. They require no lubrication and won't freeze in cold weather. You can even fire them effectively under water, and dirt seldom affects the simply engineered weapon.

MBAssociates has so far produced only pistol and carbine versions in its rocket-firing line. First-edition pistol models are being sold for $250 each, but when full production is reached, the company expects to sell the guns for about $50 apiece. The carbine sells for $200. Ammunition costs 12 to 15 cents per round.

Urheberrechtlich geschütztes Material

Most elaborate, versatile, and expensive of the half-frame cameras is the Olympus Pen F shown at left. An SLR, it has 25mm, 50-90mm zoom, and 100mm accessory lenses. Shirt-pocket model at right, the Bell and Howell/Canon Demi, gives some idea of the physical size and handling convenience of typical half-frame cameras.

Half-Frame Cameras



One frame equals . . . **two half frames**

Interested in a winsome little 35mm shirt-pocket camera that gives you twice as many shots per roll, good-quality photos, easy operation, and other features (depending on the model you select) of a full-frame 35? If so, one of the new half-frame cameras, which are rapidly gaining world-wide popularity, is for you.

What's the big attraction of half frame?

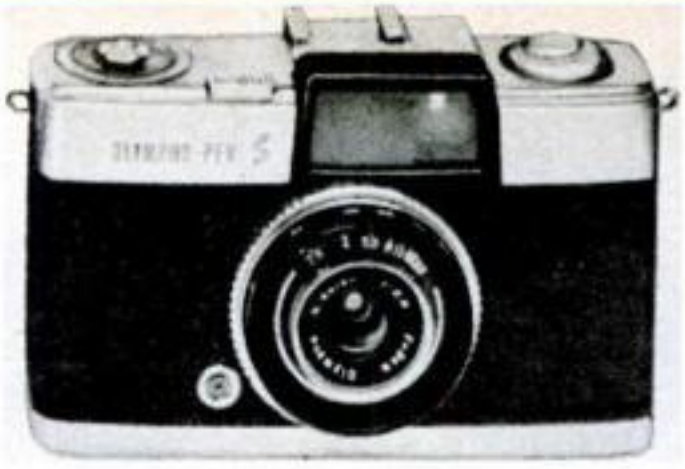
- You get 40 photos on a standard 20-exposure color or black-and-white roll of 35mm film, 72 on the 36-exposure length.
- The cameras are modestly priced.
- The typical half-frame camera is very light and fits in a pocket—a natural for those who always like to have a camera handy for that unexpected prize picture.
- Inconspicuous, mouse-quiet half-frames make perfect candid cameras.

Currently, 25 different half-frame models by eight makers are available, and more are on the way. In Japan, where nearly all are made, output of half-frame cameras tops that of any other type, and one manufacturer has sold three million since 1960. They range from box-camera-simple models to a fine single-lens reflex sophisticated enough for the most advanced photographer. And, if you want a "thinking" camera, there are models with fully automated exposure control.

Films and processing. Sometimes called "single-frame" (in keeping with movie-industry usage), the 35mm half frame measures 18 by 24mm or a bit under ¾ by 1 inch—just about the size of a regular postage stamp. Although half the area of the full 35mm frame (24 by 36mm), it is two-thirds as large in linear dimensions.

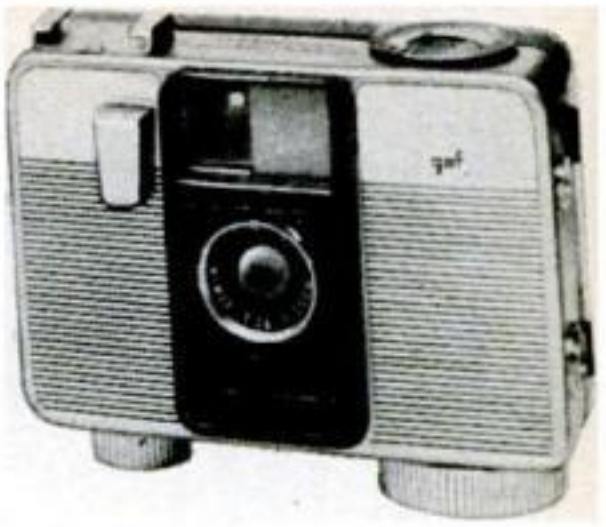
With today's excellent 35mm films, color and black-and-white, half-frame results compare very favorably with those of full-size 35mm. All half-frame cameras, except for a few Rapid System models, use the

Urheberrechtlich geschütztes Material



A typical half frame and one of the models responsible for the current craze is the Olympus Pen S. Under $50, it has a 30mm *f*/2.8 lens, shutter speeds to 1/250 second.

About the size of a pack of cigarettes, the Fujica Mini measures 3½" by 2 5/16" by 1⅝". Focus is fixed, exposure control automatic. Under $50.



Another "miniature miniature" is the Ansco Memo II which measures 3⅝" by 2½" by 1½". It offers zone focusing, 1/30 and 1/125 shutter speeds. Under $70.

You get twice as many shots per roll of 35mm film with these new lightweights—along with top-quality photos

Are Catching On

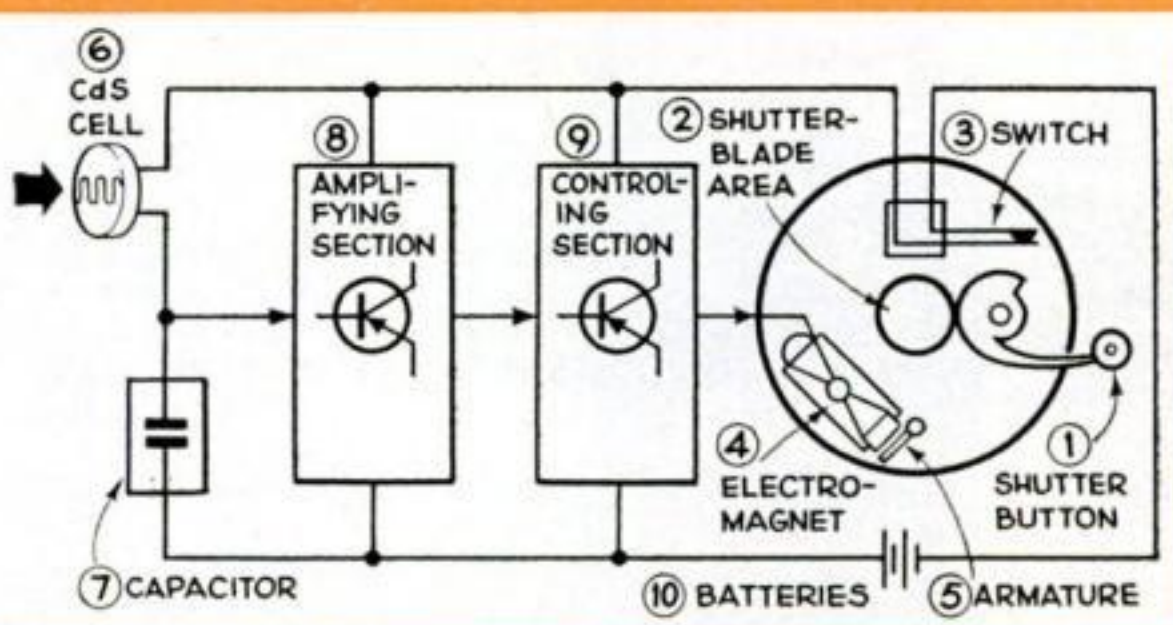
By PAUL WAHL

universally standard 35mm cartridge available in a wide range of black-and-white, reversal, and negative color films.

All leading color-film processors now return half-frame transparencies in two-by-two cardboard slide mounts. Even Kodak, which stayed aloof from half frames until very recently, has now joined the parade.

You save about 40 percent by using a half-frame camera for color photography.

Continued

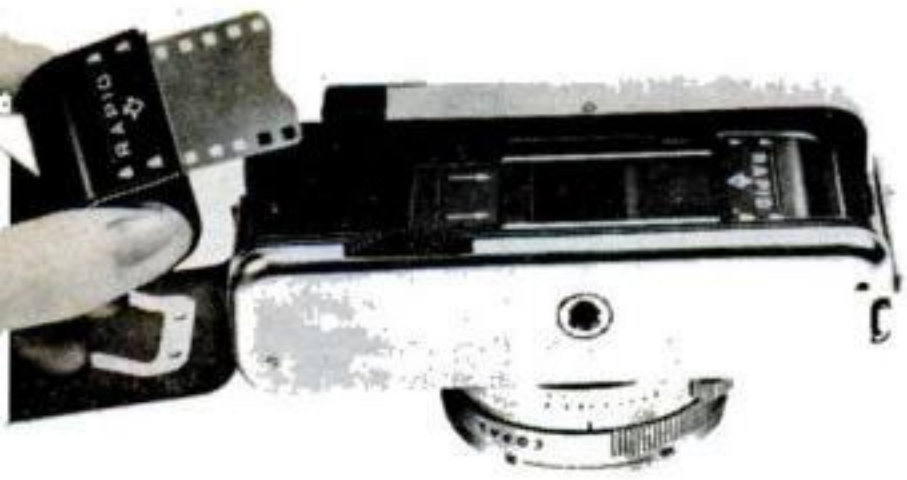


An electric motor inside the take-up reel of Pen-Olympus EM advances the film, rewinds it after.

Half-frame electronic-shutter camera

An extremely sensitive electronic shutter that automatically controls exposures over a 1/500- to 30-second range is incorporated in the new Olympus Pen EM—along with motorized drive and rewind. Simply pressing the button (1) causes the shutter (2) to open and close a switch (3). This allows the batteries (10) to charge a capacitor (7), the amount of the charge determined by the light falling on the CdS cell (6). The transistorized circuitry (8, 9) conducts, keeping the shutter open through the electromagnet and armature (4, 5), until the charge on the capacitor cuts off the circuitry and closes the shutter.

Urheberrechtlich geschütztes Material



Agfa's Rapid System loading will be used in a number of cameras, including half frames. First in U.S. is the Yashica Half 17 Rapid shown here. It makes 24 exposures on the 12-exposure Rapid film.

Featured with the Canon Demi Custom is an interchangeable 50mm *f*/2.8 lens which supplements the regular 28mm. Shutter speeds are from 1/30 to 1/250. Price of $120 includes case and both lenses.

The film cost per slide is cut in half, and the processing-mounting charge works out to about a third less. Kodak's charge for processing and mounting a 20-exposure roll (40 half frames) is $3.20, for a 36-exposure roll (72 half-frames), $5.45. Typical non-Kodak processing usually costs somewhat less.

Most film laboratories (but not Kodak) will also make prints from half-frame Kodacolor negatives.

Projection. While any 35mm slide projector can be used to show half-frame color slides if it has the usual four- or five-inch projection lens, filling even a modest-sized 40-by-40-inch screen with a half-frame slide will take projection distances of 15 to 20 feet—half again as far as for regular 35mm slides. Larger screens require proportionately longer projection distances. Even if you have enough room for a long throw, light loss may make it impractical.

Two- or three-inch lenses, available for most projectors, are better for half-frame slide projection; the two-inch focal length will fill a 40-by-40-inch screen at less than eight feet. The Olympus Pen Slide Projector II ($39.95), designed especially for half frame, has a 55mm (2 3/16-inch) lens.

Camera features. Aside from generally smaller size, largely made possible by the reduced 18-by-24mm format, the typical half-frame camera is not unlike a conventional 35mm in its basic features. Loading is the same. Film advance and shutter cocking is accomplished by turning a lever or thumb wheel, although a few models have spring-motor drives. Most have folding cranks for rapid rewind of film.

Exposure counters usually are manually reset. Nearly all of these cameras have standard accessory shoes and sockets for tripod, cable release, and flash connection. Typical shutter is leaf type, between or behind the lens, synchronized for flash. In some automatic-exposure cameras, the top (or only) shutter speed is too slow (1/60-

PS BUYERS'

MAKE & MODEL	PRICE	DIMENSIONS (W-H-D)
Agfa **Parat I**	$32.50	4¼" x 2⅞" x 1⅞"
Agfa Paramat	$59.95	4¼" x 2⅞" x 1⅞"
Ansco Memo II[1]	about $70	3⅝" x 2½" x 1½"
B&H/Canon Dial 35[2]	about $80	3" x 3¾" x 1¼"
B&H/Canon Demi	about $55	4⅜" x 2⅝" x 1½"
B&H/Canon Demi S	about $96	4½" x 2⅝" x 2"
Canon Demi Custom[3]	about $120	4½" x 2¾" x 1½"
Fujica Half	$59.95	4⅜" x 2⅞" x 1¾"
Fujica Drive[4]	$69.95	4⅜" x 2⅞" x 1¾"
Fujica Half 1.9	$75.00	4⅜" x 2⅞" x 1⅞"
Fujica Mini[5]	$49.95	3½" x 2⅝" x 1⅝"
Minolta Repo[6]	about $57	4¼" x 2 11/16" x 1⅞"
Olympus Pen	$34.95	4¼" x 2 11/16" x 1 5/16"
Olympus Pen S	$44.95	4¼" x 2 11/16" x 1¾"
Olympus Pen W	$49.95	4¼" x 2⅝" x 1¼"
Olympus Pen D	$69.95	4¼" x 2½" x 1¾"
Olympus Pen D2[7]	$85.95	4¼" x 2½" x 1¾"
Olympus Pen EE	$49.95	4⅛" x 2½" x 1¼"
Olympus Pen EES	$59.95	4¼" x 2½" x 1¾"
Olympus Pen F[8]	$139.95	5" x 2¾" x 2½"
Petri **Half 7**[9]	$54.80	4 1/16" x 2 11/16" x 1¾"
Yashica 72E	about $45	4¼" x 2 11/16" x 1¾"
Yashica Mimy	about $45	4¼" x 2¾" x 1¾"
Yashica Half 17	about $75	4½" x 2¾" x 2⅛"
Yashica Half 17 Rapid[10]	about $75	4¾" x 2 13/16" x 2 3/16"

1. Spring-motor film advance
2. Spring-motor film advance, CdS meter, shutter speed preselected by user
3. Furnished with interchangeable 50mm f/2.8 lens; price includes case
4. Spring-motor film advance

Urheberrechtlich geschütztes Material

1/125) for action shots, although adequate for general use.

Automated exposure control usually requires only the setting of the film-exposure index; an electric-eye system measures the light and automatically selects the lens aperture and shutter speed, signals when light is too dim and use of flash is indicated. With most automatic-exposure systems, the user is afforded some degree of manual override. A few half-frame cameras have match-needle exposure control: You line up the exposure-meter indicator with a pointer that is coupled to the exposure control, setting the lens aperture and shutter speed automatically.

Standard lenses of half-frame cameras range from 25 to 38mm in focal length and from *f*/1.7 to *f*/3.5 in maximum aperture. Most common is 28mm *f*/2.8, well suited to general use. Because of their short focal lengths, half-frame-camera lenses have relatively great depth of field and focusing is usually noncritical.

With the exception of the reflex-focusing Olympus Pen F, no current half frame has a focusing system other than by zone symbols or scale, and a few are fixed focus. Fixed focus is okay for casual snapshots, but serious photography demands some control of focus. Zone focus is set by symbols (on the lens mount and/or visible in the viewfinder) representing distant, near, and close subjects. Scale-focusing cameras have a range of from two or three feet to infinity.

Most half-frame cameras have efficient bright-frame viewfinders, some of which include focus and exposure-control indicators, dim-light signals, etc., all visible with the camera in picture-taking position.

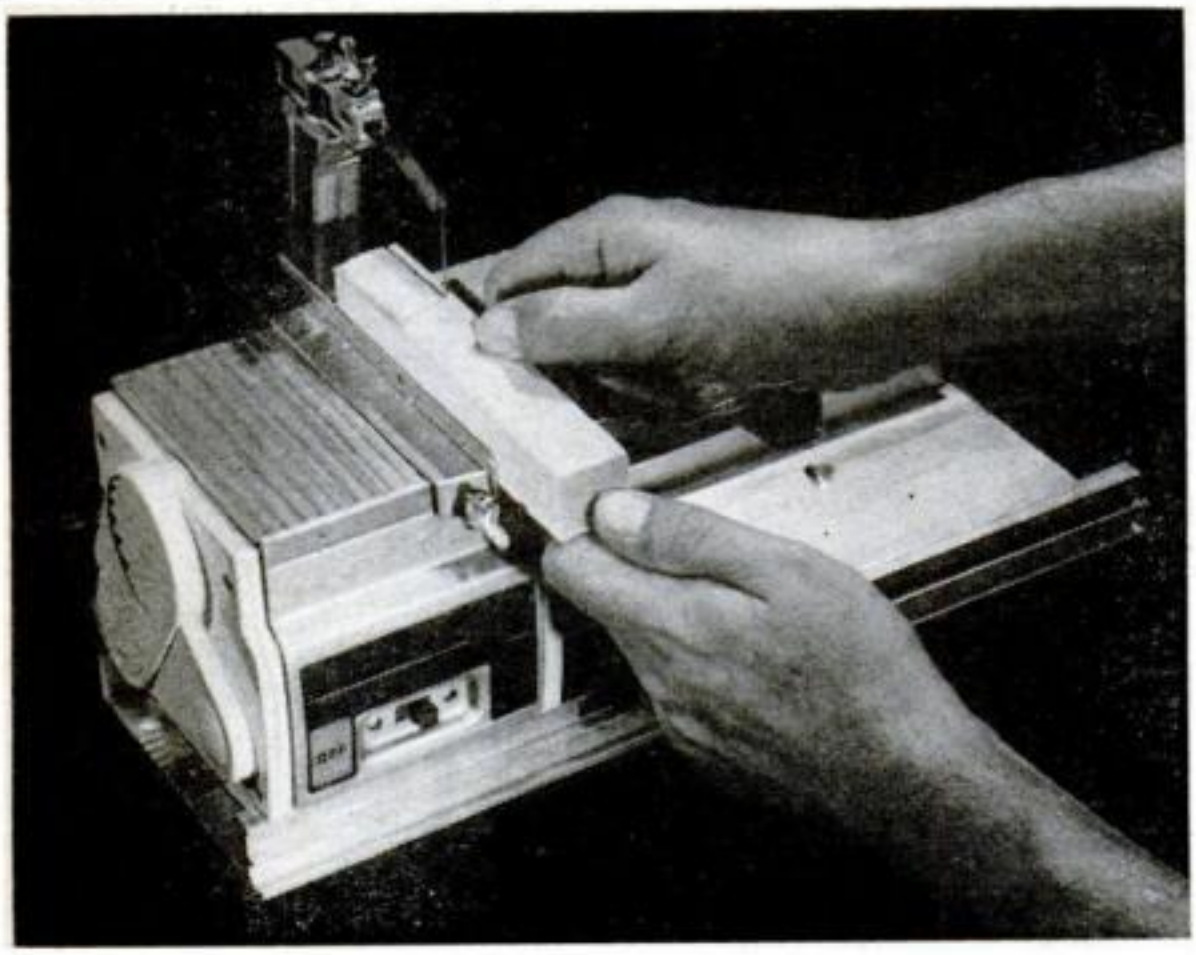
Should you buy a half-frame camera? Yes, if you're at all interested in 35mm photography or if the other features appeal to you. These little cameras have much to offer every photographer in economy, convenience of operation, and picture-making capability. PS

GUIDE FOR HALF-FRAME CAMERAS

WEIGHT	LENS	FOCUSING	SHUTTER	EXPOSURE CONTROL
10 oz.	30mm f/2.8	zone or scale	1/30-1/125, B, sync	manual, no meter
12 oz.	30mm f/2.8	zone or scale	1/30, 1/125, B, sync	automatic (ASA 10-200) or manual
11 oz.	25mm f/2.8	zone	1/30, 1/125, sync	automatic (ASA 12-200) or manual
15 oz.	28mm f/2.8	scale	1/30-1/250, sync	automatic (ASA 8-500) or manual
11½ oz.	28mm f/2.8	zone	1/30-1/250, B, sync	match-needle (ASA 10-400) or manual
14½ oz.	30mm f/1.7	zone	1.8-1/500, B, sync	match-needle (ASA 25-400) or manual
14 oz.	28mm f/2.8	zone	1/30-1/250, B, sync	match-needle (ASA 10-400) or manual
16 oz.	28mm f/2.8	scale	1/30-1/300, B, sync	automatic (ASA 10-200) or manual
18½ oz.	28mm f/2.8	scale	1/30-1/300, B, sync	automatic (ASA 12-200) or manual
17½ oz.	33mm f/1.9	scale	1/8-1/500, B, sync	automatic (ASA 25-400) or manual
10 oz.	25mm f/2.8	fixed	1/100	match-needle (ASA 25-200)
15 oz.	30mm f/2.8	scale	1/30-1/250, B, sync	match-needle (ASA 10-400) or manual
12½ oz.	28mm f/3.5	scale	1/25-1/200, B, sync	manual, no meter
14 oz.	30mm f/2.8	scale	1/8-1/250, B, sync	manual, no meter
13½ oz.	25mm f/2.8	scale	1/8-1/250, B, sync	manual, no meter
14 oz.	32mm f/1.9	scale	1/8-1/500, B, sync	manual, built-in meter not coupled
15 oz.	32mm f/1.9	scale	1/8-1/500, B, sync	manual, built-in meter not coupled
13½ oz.	28mm f/3.5	fixed	1/40, 1/200, sync	automatic (ASA 10-200) or manual
14 oz.	30mm f/2.8	zone	1/40, 1/200, sync	automatic (ASA 10-200) or manual
20½ oz.	38mm f/1.8	reflex	1-1/500, B, sync	manual, accessory meter couples to shutter dial
13 oz.	28mm f/2.8	zone	1/30-1/250, sync	automatic (ASA 10-200) or manual
13½ oz.	28mm f/2.8	scale	1/8-1/250, B, sync	manual, built-in meter not coupled
13 oz.	28mm f/2.8	fixed	1/60, sync	automatic (ASA 10-200) or manual
16½ oz.	32mm f/1.7	zone or scale	1/30-1/800, B, sync	automatic (ASA 12-400) or manual
17 oz.	32mm f/1.7	zone or scale	1/30-1/800, B, sync	automatic (ASA 12-400) or manual

5. Ratchet rapid wind, smallest half-frame camera
6. Price includes case
7. CdS meter
8. Eye-level SLR, rotary focal plane shutter, interchangeable accessory lenses (25, 50-90 zoom, and 100mm)
9. Price includes case
10. Uses Rapid System film cassette

Urheberrechtlich geschütztes Material



Tiny jigsaw cuts wood, won't cut finger

Spiral teeth can't get grip on flexing skin of finger; rub, won't cut.

This junior-size power shop runs on house current and can be set up as a lathe, sander, drill press, or the jigsaw shown. The spiral-tooth jigsaw blade will cut wood but not your finger. Its teeth pull away chips of firm wood, even hardwood, while skin flexes; the blade rubs but won't cut.

Built by Mattel, Hawthorne, Calif., toymakers, the $25 power shop is intended to teach woodworking to youngsters, but also will do small jobs in a home workshop. It comes with lathe bits, drills, jigsaw blades, and sanding disks. Power is so low the motor will stall without burning out.

Foil throwaway spoons

Lift up the sealed lid of the aluminum-foil spoon above, dunk its contents in a cup of boiling water, stir, and you have coffee.

Alcoa makes the throwaway foil dispensers for one-time use. Besides instant coffee, they contain bouillon, dry soup mixes, tea, chocolate, and medicines. Tea leaves are held behind a porous lid that doesn't need to be lifted.

Gas burners lighted provide warmth to combat freeze. They are six inches high and three feet from tree.

Spray heads shower irrigation water from laterals branching off the main water line traversing grove.

Pipeline warms or irrigates trees

A dual-purpose pipeline is proving a big help to Florida orange growers. With liquid petroleum gas connected to the pipeline and burner heads screwed in place, the pipeline serves as a series of smudge pots to warm the trees when there is danger of a freeze. In a dry summer when there is danger of drought, the burners are unscrewed and replaced by sprinkler heads. Then water is pumped through the pipeline, instead of gas, to irrigate the grove.

Urheberrechtlich geschütztes Material

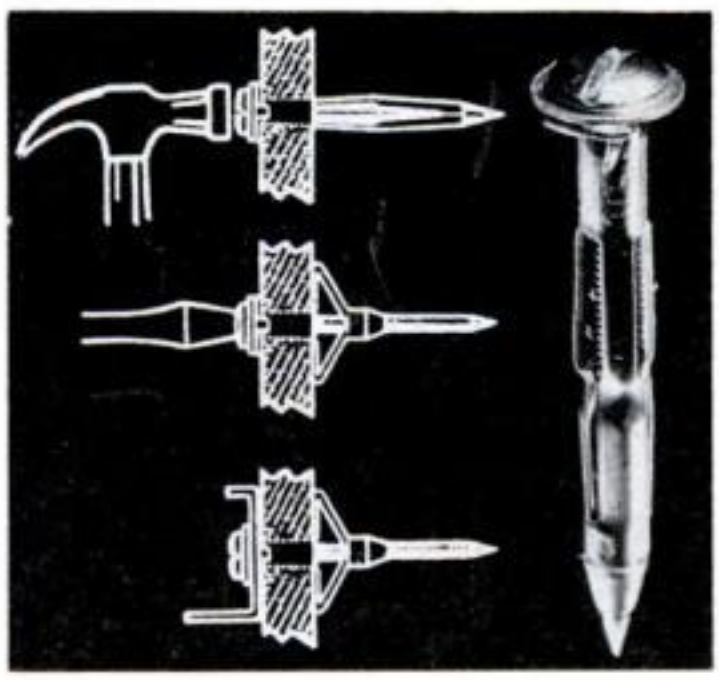
Shop Talk

By ROBERT P. STEVENSON

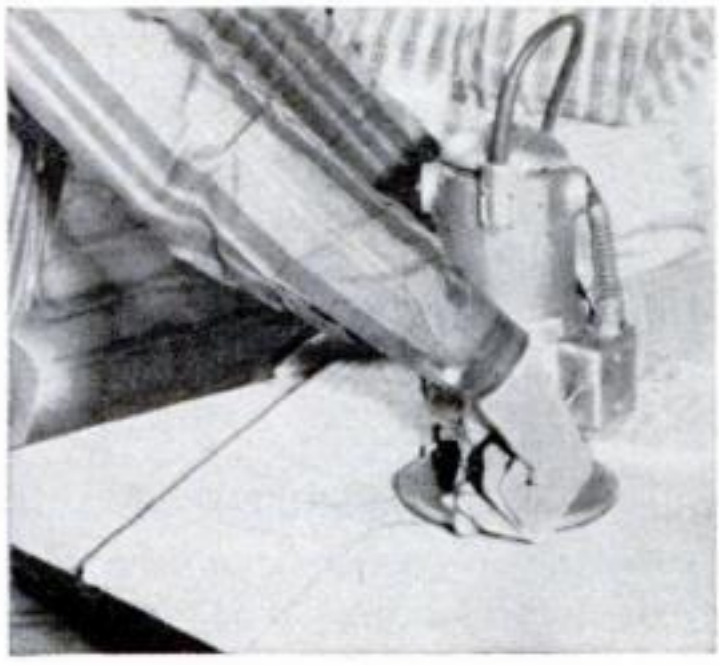
You can wipe away measuring marks penciled on this new tape

Sometimes you come across a tool that makes you wonder why it wasn't thought of before. Stanley's new steel layout tape is like that. The 12′ tape has conventional graduations along one edge. But, unlike other tapes, the opposite edge is blank—for an interesting reason. The entire ¾″-wide blade is clad in a supertough Mylar film, specially finished to take pencil marks that then easily wipe off. So when you take a measurement, you mark the blank edge of the tape, carry the tape to the work, mark the work, and then wipe the tape clean with your thumb. No need to try to remember the dimension—and take a chance of being wrong. The people at Stanley expect the tape to take the place of the scrap pieces of lumber on which the pros in the building trades have long transferred such measurements. It was added to the Stanley line after field research revealed many workers using the stick method. It will be available after Jan. 1. Price: about $4.

Short shots at a lot of interesting subjects



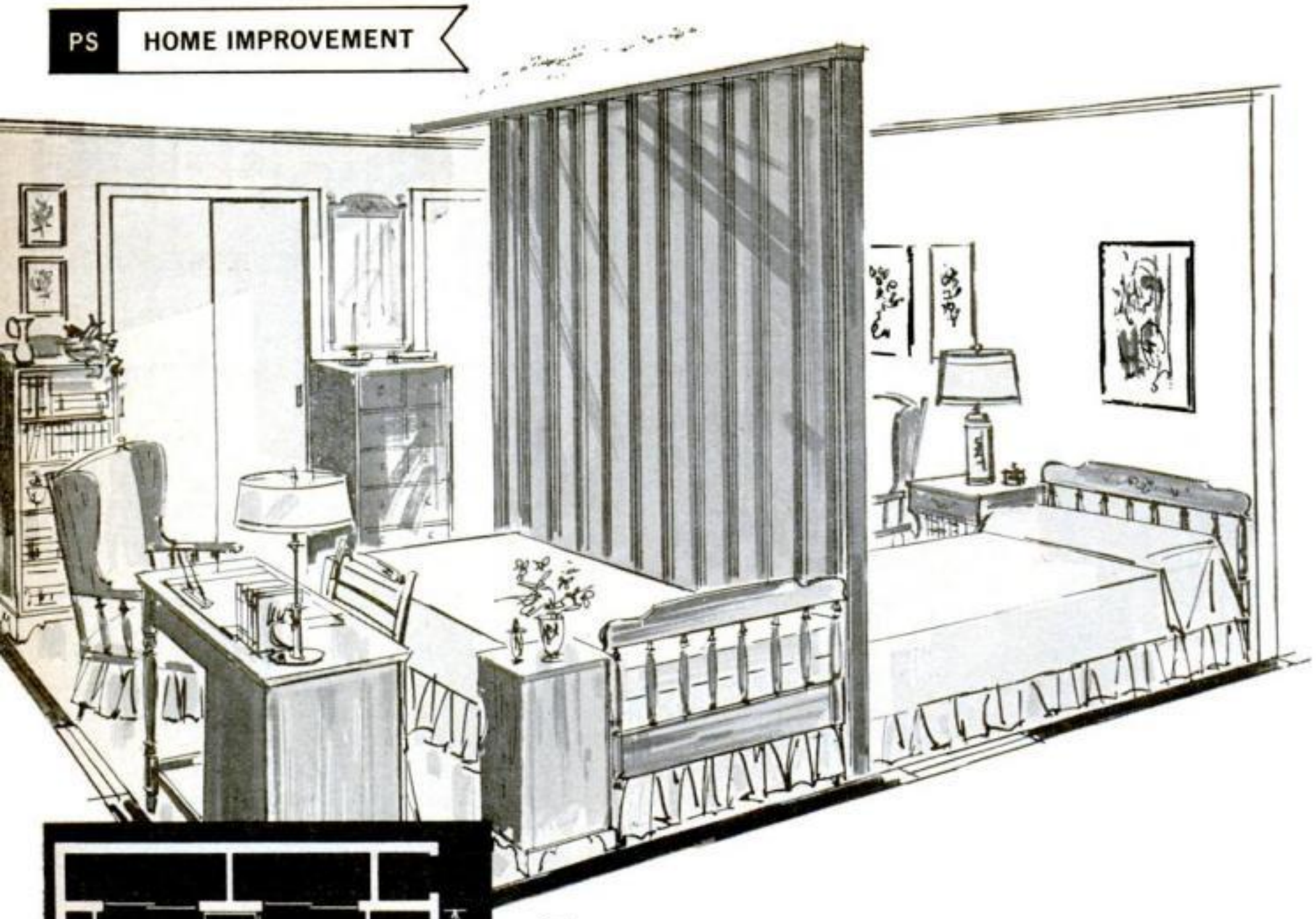
It's not necessary to drill the wall for new wall anchors offered by the Ramset Operations of Olin Mathieson Chemical Corp. They're pointed, like a nail. You drive them in with a hammer (see illustration at the left), then snug up the anchor with a screwdriver. Very simple and fast. The new anchors come in three lengths: 1⅜″, 1 11/16″, and 2⅜″ . . . A clipping from our European editor reports that a British patent has been issued for an electric cable with a backing of pressure-sensitive tape. Sounds like this could be a useful item for home handymen if it reaches the market . . . Kerr Chemicals, Des Plaines, Ill., has introduced grease in aerosol cans. A snorkel tube helps you blow the grease into hard-to-reach spots . . . Interested in building your own track for slot-racing miniature cars? Ekstrom, Carlson & Co., Rockford, Ill., has a tip for you: The company's ⅛″ router bit is just the ticket for cutting a smooth and accurate groove. Use a guide template sawed from waste plywood, as shown at left . . . If you occasionally make sketches out in the field, away from shop or office conveniences, you ought to check out a portable drawing board offered by Chutich Wood Products, 10450 N. Milwaukee Ave., Des Plaines, Ill. The board forms a lid for a lightweight supply box.



Stir paint with a drill? Don't! It may explode

A lot of us have chucked a bent-wire accessory into an electric drill to stir paint. You find the stirrer in many drill kits. The National Safety Council cautions that its use is hazardous. Some paints have a low flashpoint. Sparks from the drill commutator may ignite the vapor.

Urheberrechtlich geschütztes Material



1 The best possible room divider is one of the many folding partitions on the market. These have the advantage of dividing the room partially or completely. They need no floor track, and they eliminate the necessity for a door. These partitions come in several finished woods as well as in vinyl fabrics in many colors and designs. They also provide almost as much sound insulation as the usual stud partition. Ceiling tracks are screwed to the joists, and their nylon glides are almost noiseless in operation.

How Two Can Live Happily

Here are seven ways to control unwanted light and sound in a small area

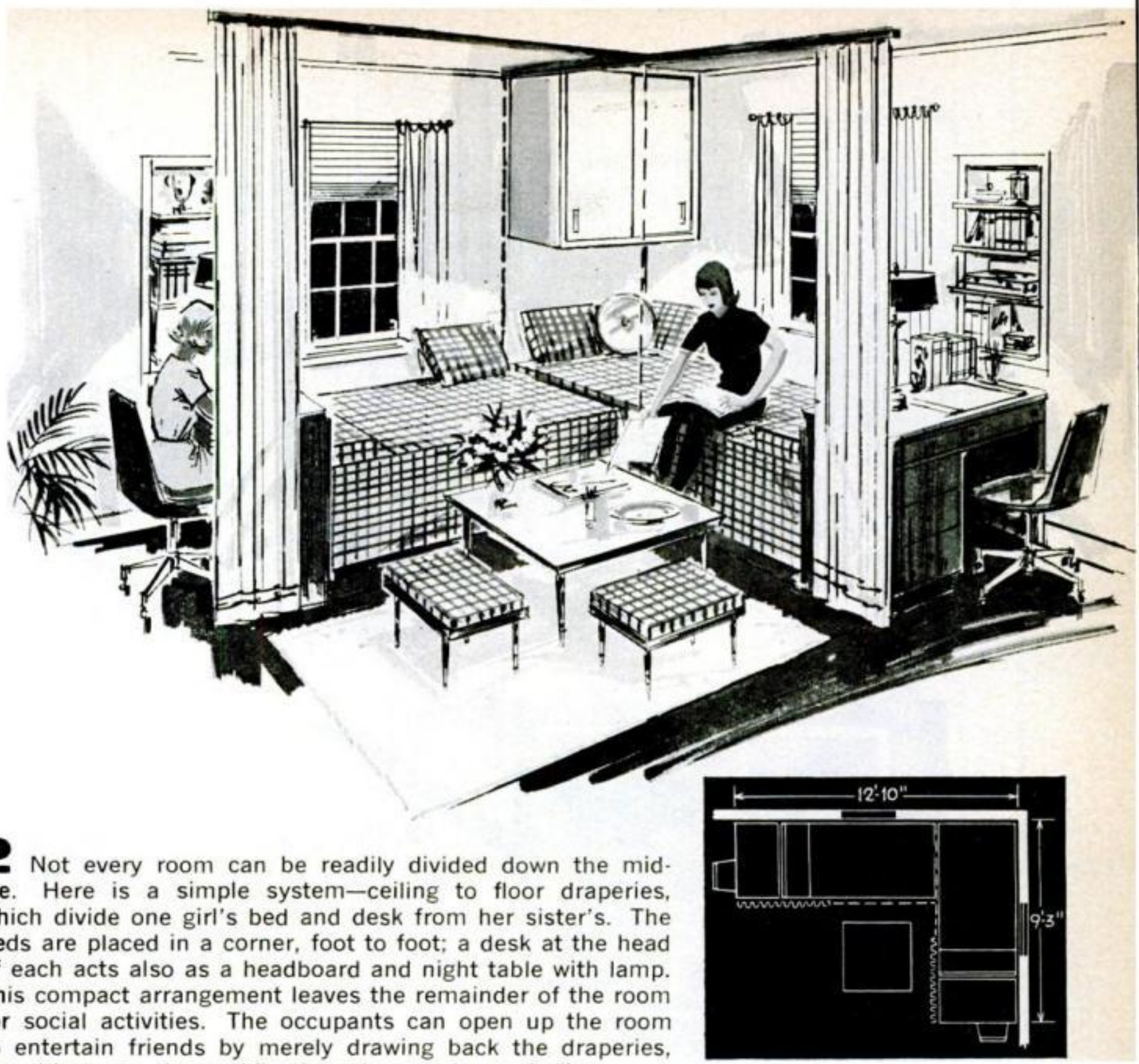
By CARL SIGMAN

A separate room for each member of the family is an ideal situation for any household. But large families (or small homes) often make this impossible. Expensive room additions to accommodate children or in-laws can become superfluous space in a few years' time as children grow up and go off, or in-laws retire to sunnier climes.

Making one room do double duty is a sensible and inexpensive solution, one that can be well within the capabilities of the average family craftsman. The ideas shown here are not temporary stopgaps. But they do have the advantage of being removable when the need for them has passed.

The two main problems that are faced here are control of unwanted light and noise —problems that always occur when two people occupy the same room.

Urheberrechtlich geschütztes Material



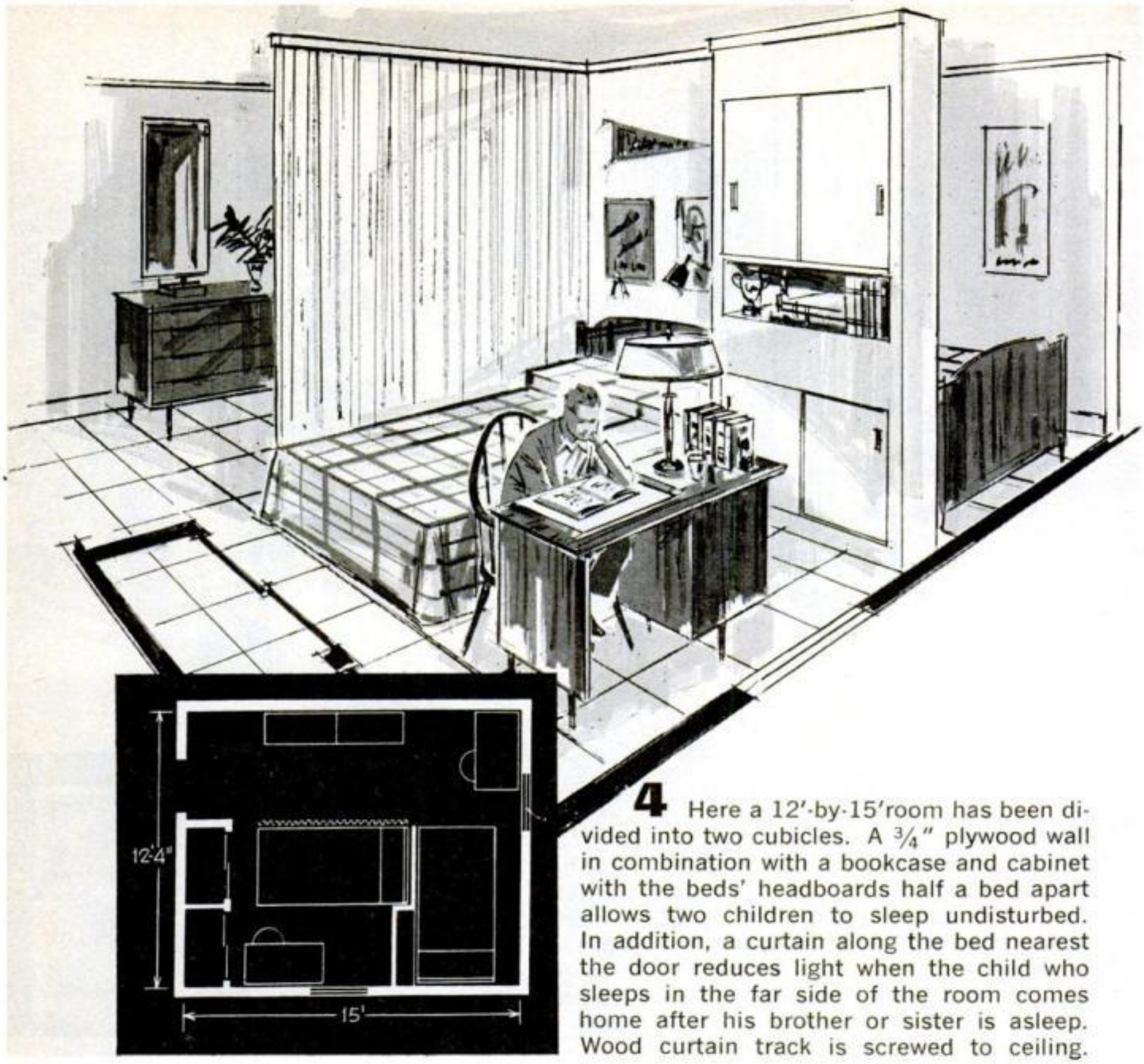
2 Not every room can be readily divided down the middle. Here is a simple system—ceiling to floor draperies, which divide one girl's bed and desk from her sister's. The beds are placed in a corner, foot to foot; a desk at the head of each acts also as a headboard and night table with lamp. This compact arrangement leaves the remainder of the room for social activities. The occupants can open up the room to entertain friends by merely drawing back the draperies, yet either can sleep while the other reads or studies.

in the Same Room

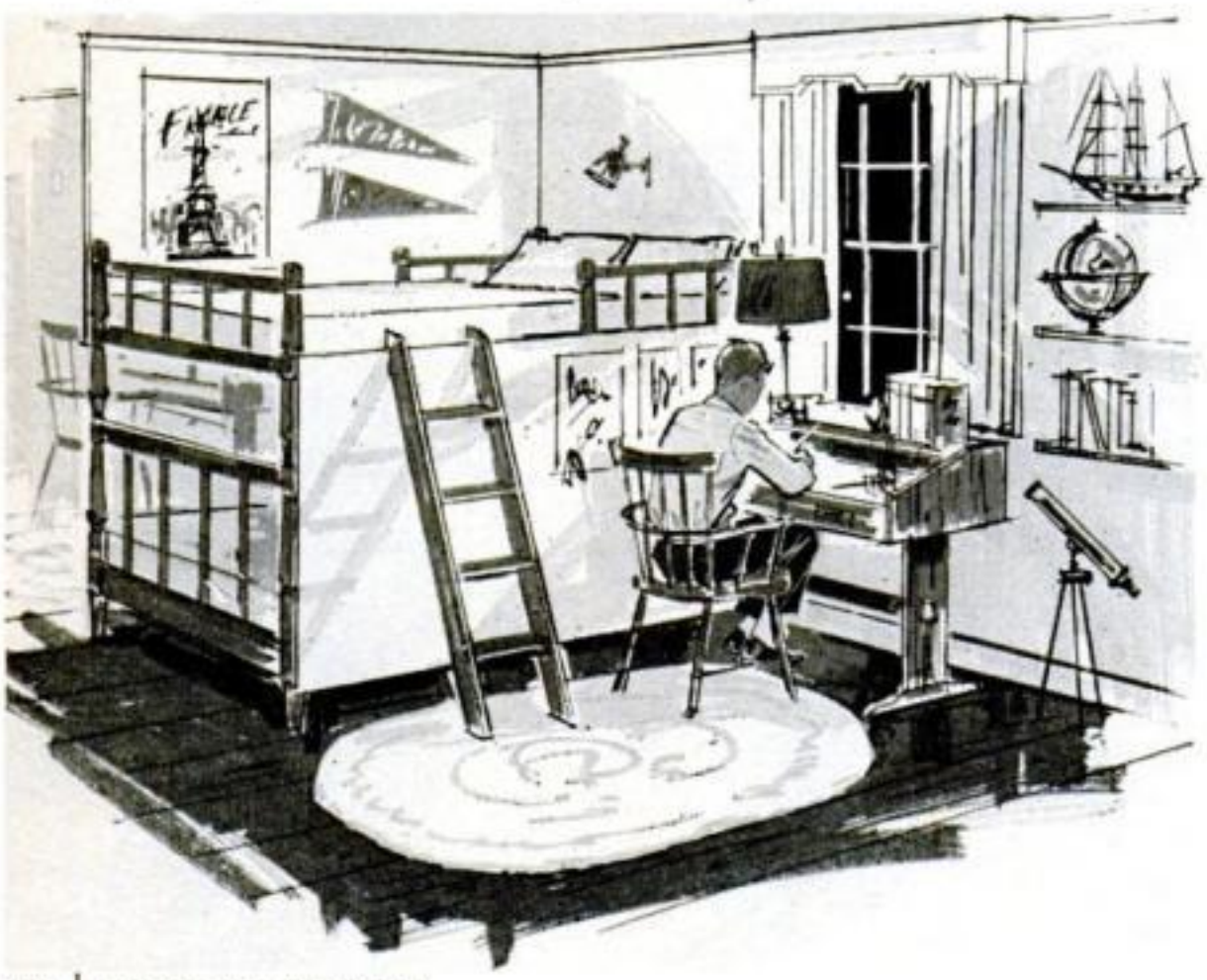
3 A simple partition built between twin beds will help enormously to separate people with different sleeping patterns. It will eliminate bothersome light and a great deal of sound. This one is made of ½" or ¾" plywood. Or use less expensive plasterboard and paint or paper it. Four 4'-by-8' sheets are required, nailed either vertically or horizontally to two-by-four studs used flat so that the partition will be about 3" thick. The studs can be 24" on centers if the partition is securely anchored to the floor and ceiling. Use two-by-twos at the ceiling on either side of the top, screwed or nailed to the joists; the same at floor.

Continued

Urheberrechtlich geschütztes Material

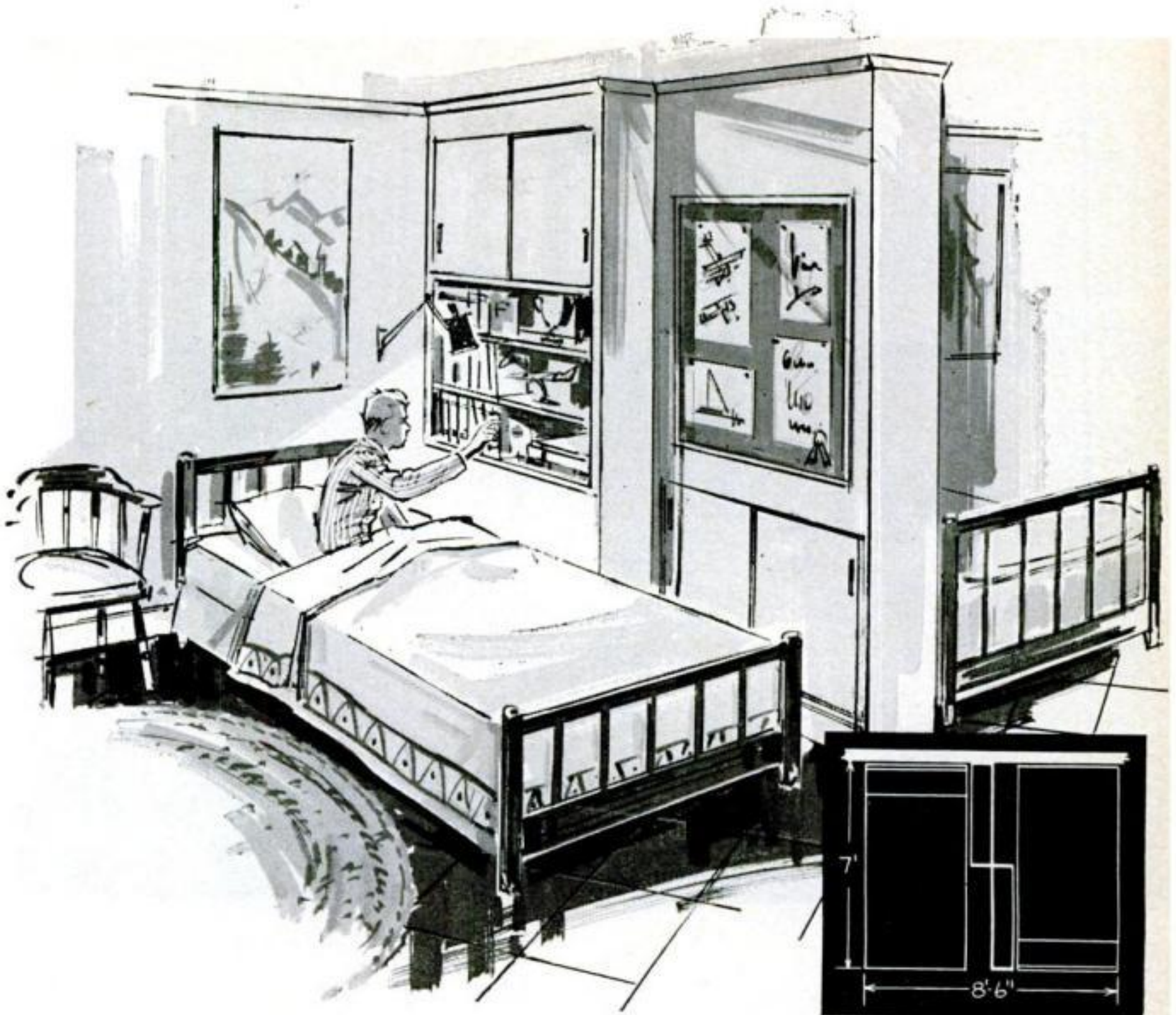


4 Here a 12'-by-15'room has been divided into two cubicles. A ¾" plywood wall in combination with a bookcase and cabinet with the beds' headboards half a bed apart allows two children to sleep undisturbed. In addition, a curtain along the bed nearest the door reduces light when the child who sleeps in the far side of the room comes home after his brother or sister is asleep. Wood curtain track is screwed to ceiling.



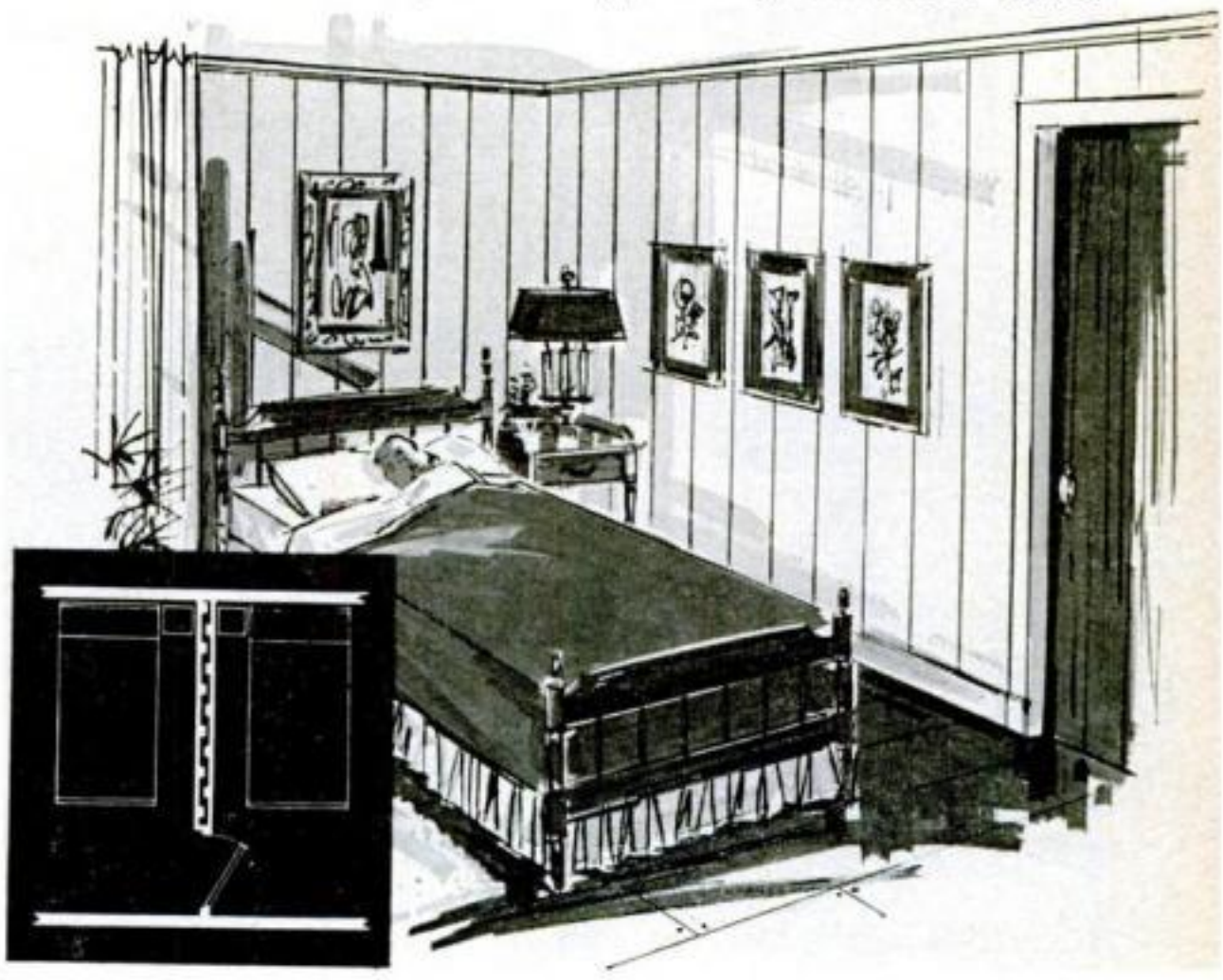
5 Where double-deck beds are in use, there still can be privacy. A ½"-plywood panel is dropped from the ceiling to the bottom of one edge of the upper bunk. Then another panel extends from the opposite side of the upper bunk to the floor. Bunks are entered from opposite sides. Properly braced, these panels can be supported by the bunk frames, and need not be fastened to the ceiling or wall unless a more permanent installation is desired. In that case fasten one-by-ones to either side of the plywood and screw these braces to the ceiling joists. The boys can study on either side without disturbance.

Urheberrechtlich geschütztes Material



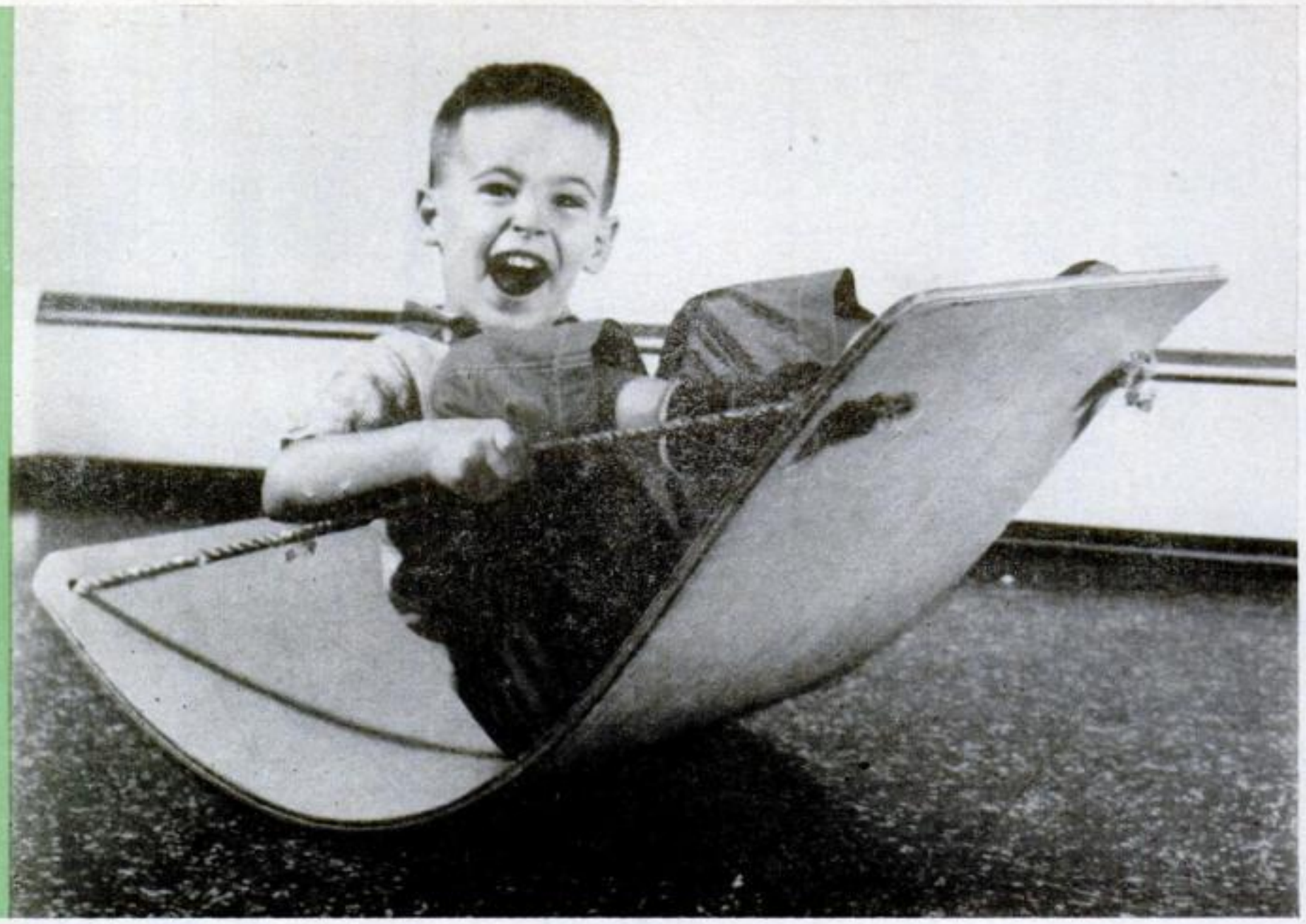
6 Should room space permit, a short partition could include bookcases and storage cabinets staggered to serve both sides. A shelf would serve as a night table with a swing-out lamp for reading. In this case one bed would be reversed, foot-to-head from the other. The bulk and depth of this design are helpful in suppressing unwanted noise.

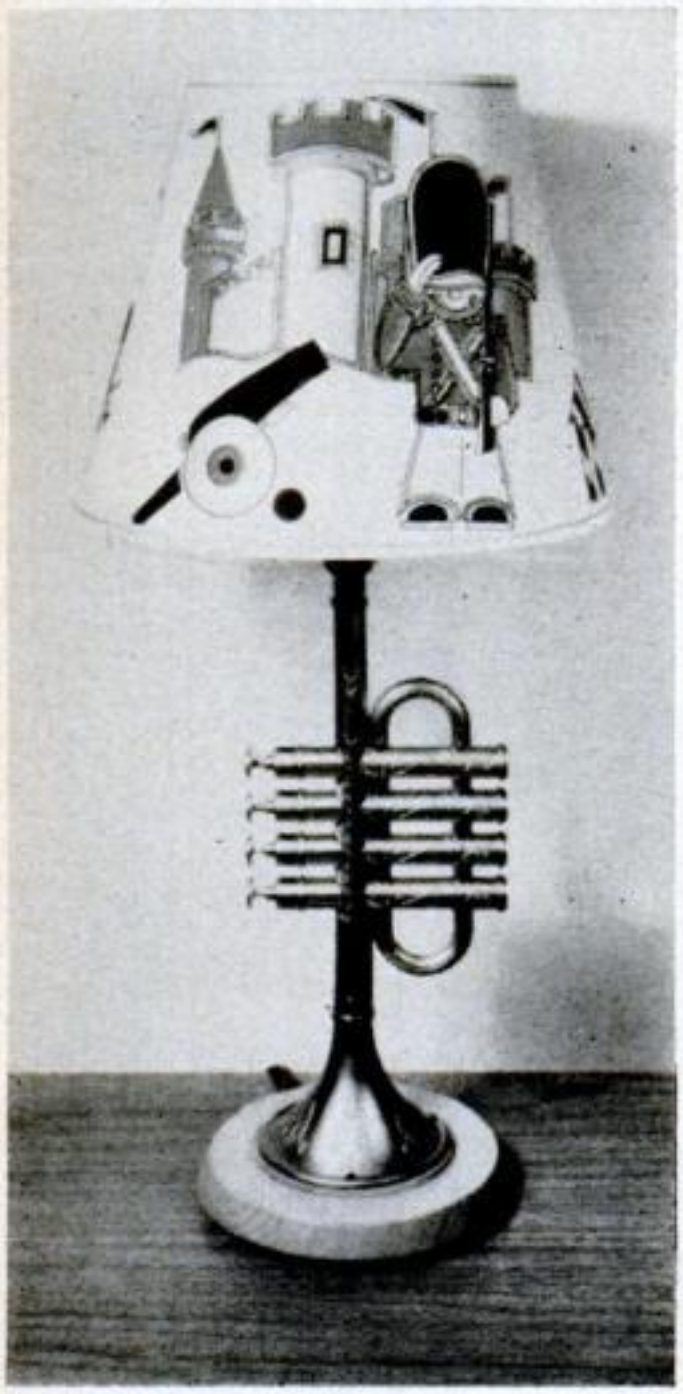
7 When noise is a real problem, the solution has to be more elaborate. In this case the partition extends across the room, and a door is added. Framing will consist of a two-by-four plate and sole, and two-by-four studs set flat and staggered as shown in the plan. The dead-air space between studs is a real sound insulator. But for added sound deadening, roll insulation can be woven between the studs. The wall finish can be plaster, plasterboard, plywood, or hardboard. Paint or paper the new partition to blend with the rest of the room. PS



Urheberrechtlich geschütztes Material

3 PROJECTS

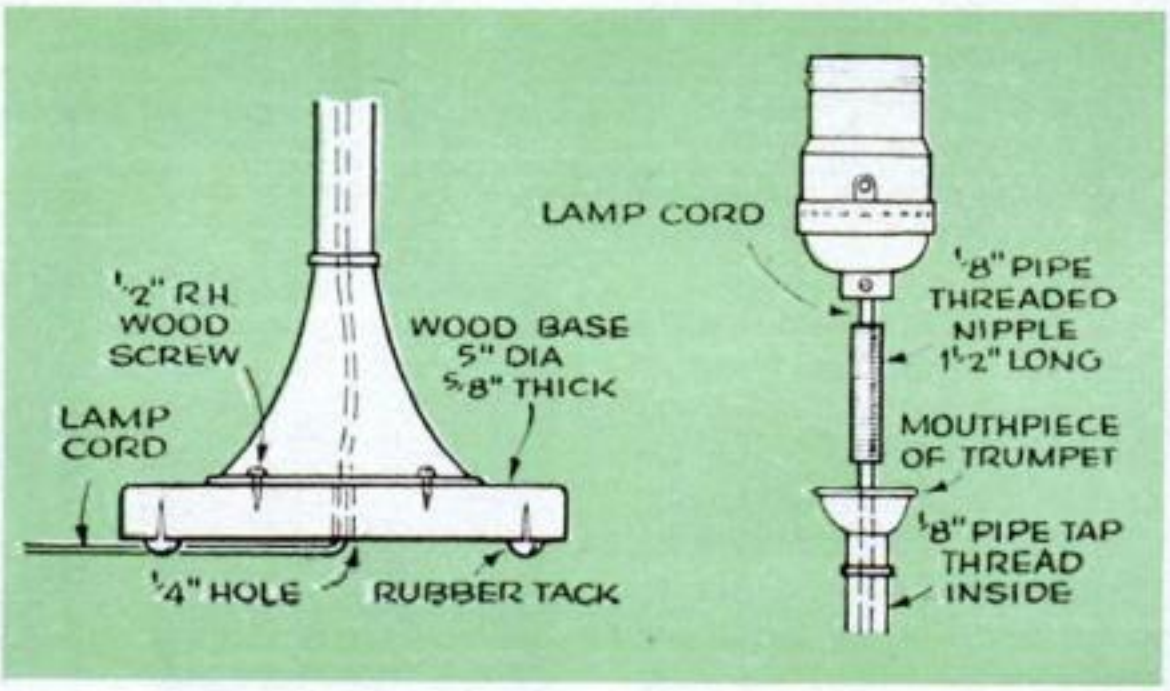




Trumpet Lamp

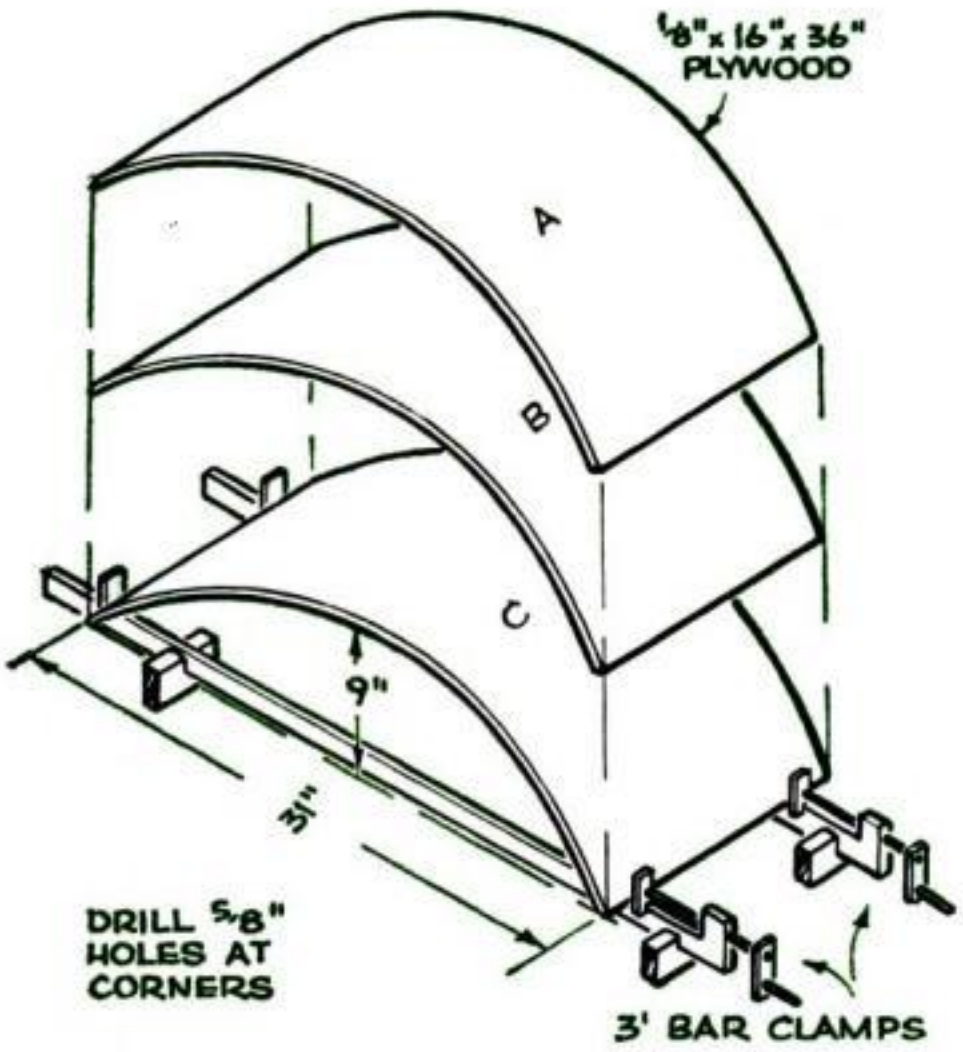
Use a plastic trumpet that's sold in toy departments everywhere to make a decorative lamp for the children's room. Screw-fasten the trumpet to a round wood base jigsawed from ⅝" stock. Drill a ¼" hole in the center of the base to accommodate the cord, and use three rubber-tack bumpers to hold the base off the table. Fasten a standard lamp socket to the trumpet mouthpiece using a brass nipple threaded as shown in the drawing. Top it off with a "Nutcracker Suite" shade that you can buy at the dime store.

ART TRAUFFER, Council Bluffs, Iowa.



Urheberrechtlich geschütztes Material

FOR A CHILD'S ROOM



Plywood Rocker

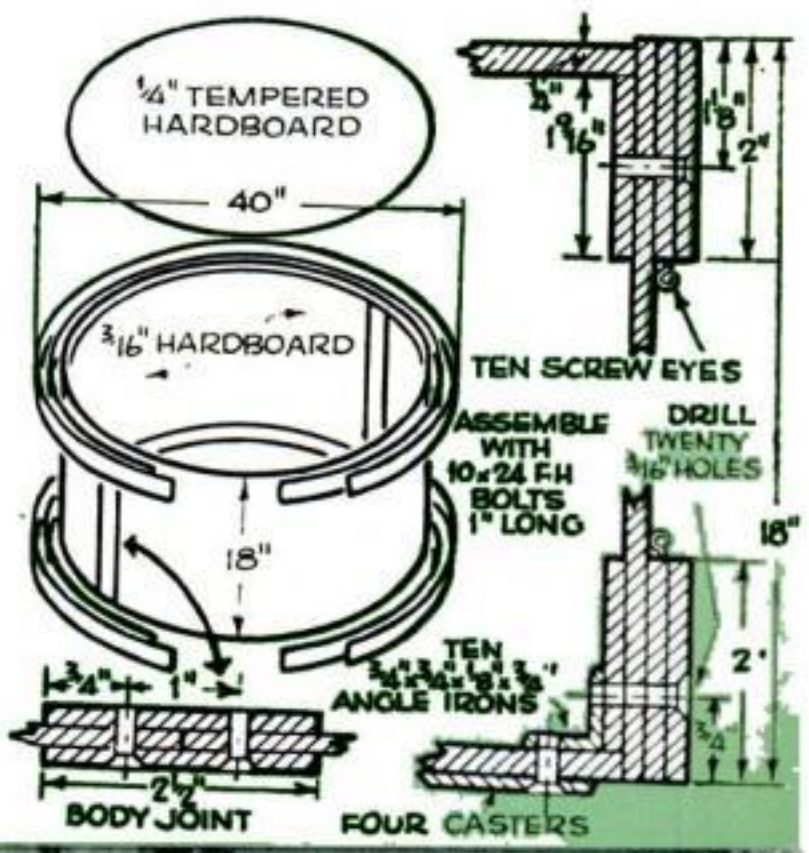
A boy can ride this toy like a galloping horse, then flip it over to make a tunnel to crawl through. Make it from a 4′-by-4″ sheet of ⅛″ gum or poplar plywood. Cut out three 16″-by-36″ rectangles with the grain across the width. Set two bar clamps on supports as shown in the drawing. Coat one side of each outer layer and both sides of the inner layer with white resin glue and stack them on the bar clamps. Tighten the bar clamps until the center of the panels curves up about 9″. Clamp the layers together every few inches along the outside edges. After the glue has set, trim the edges and round the corners. Drill ⅝″ holes in each corner. Finish with two coats of varnish. Lace nylon rope through the four holes with knots at each end. Bend the board slightly before tying the knots so that the rope will be taut.

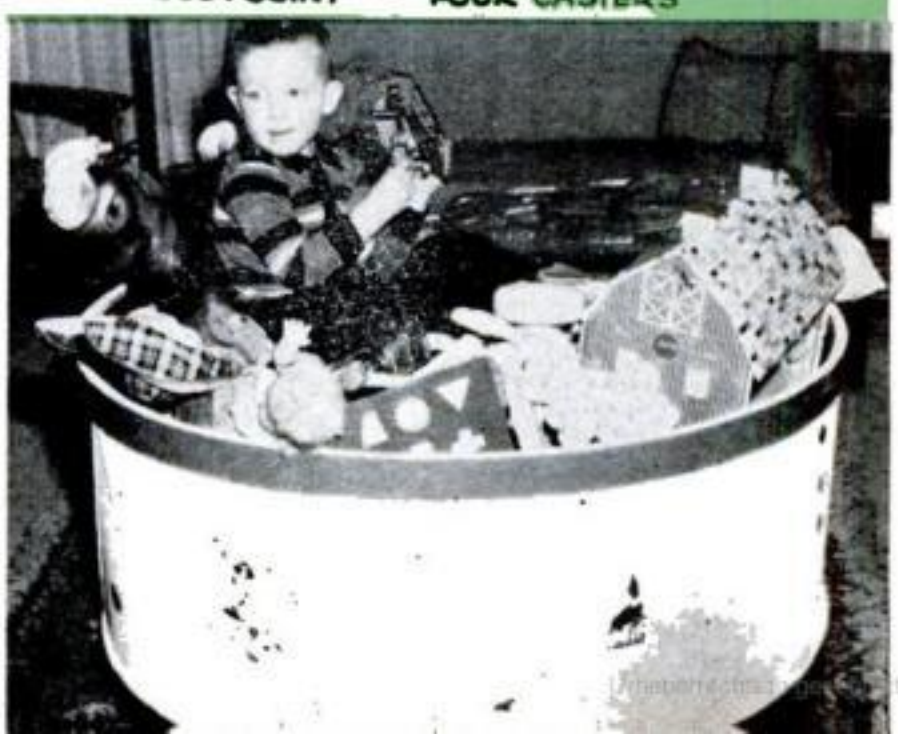
JOHN E. REPPERT, Hamburg, Pa.

Big Drum Toy Box

Build a big bass-drum toy bin to hold all those toys that children seem to collect so fast. It's made from one 3/16″ and one ¼″ sheet of 4′-by-8′ hardboard. First cut out two 18″-by-75″ pieces for the drum sides and all the reinforcing strips from the 3/16″ hardboard. Use a 2″-by-18″ strip to join the big pieces end to end. Then place the assembly on a pad of newspapers. Boil two gallons of water and add a heaping tablespoon of detergent. Soak the newspapers and the hardboard with this, cover with more newspapers, and sprinkle them too. After six hours the hardboard will be ready to bend into a drum shape. Use another strip to join the ends together. Surround the drum top and bottom with two strips on the outside and a single strip on the inside, set in from the edges. Bolt everything together. Cut disks from ¼″ hardboard for bottom and lid. Bolt the bottom with small angle braces as shown in the drawing. Put screw eyes around the top and bottom rims and lace cord through them.

DARRELL HUFF, Pacific Grove, Calif.





PS **HOME REPAIRS**

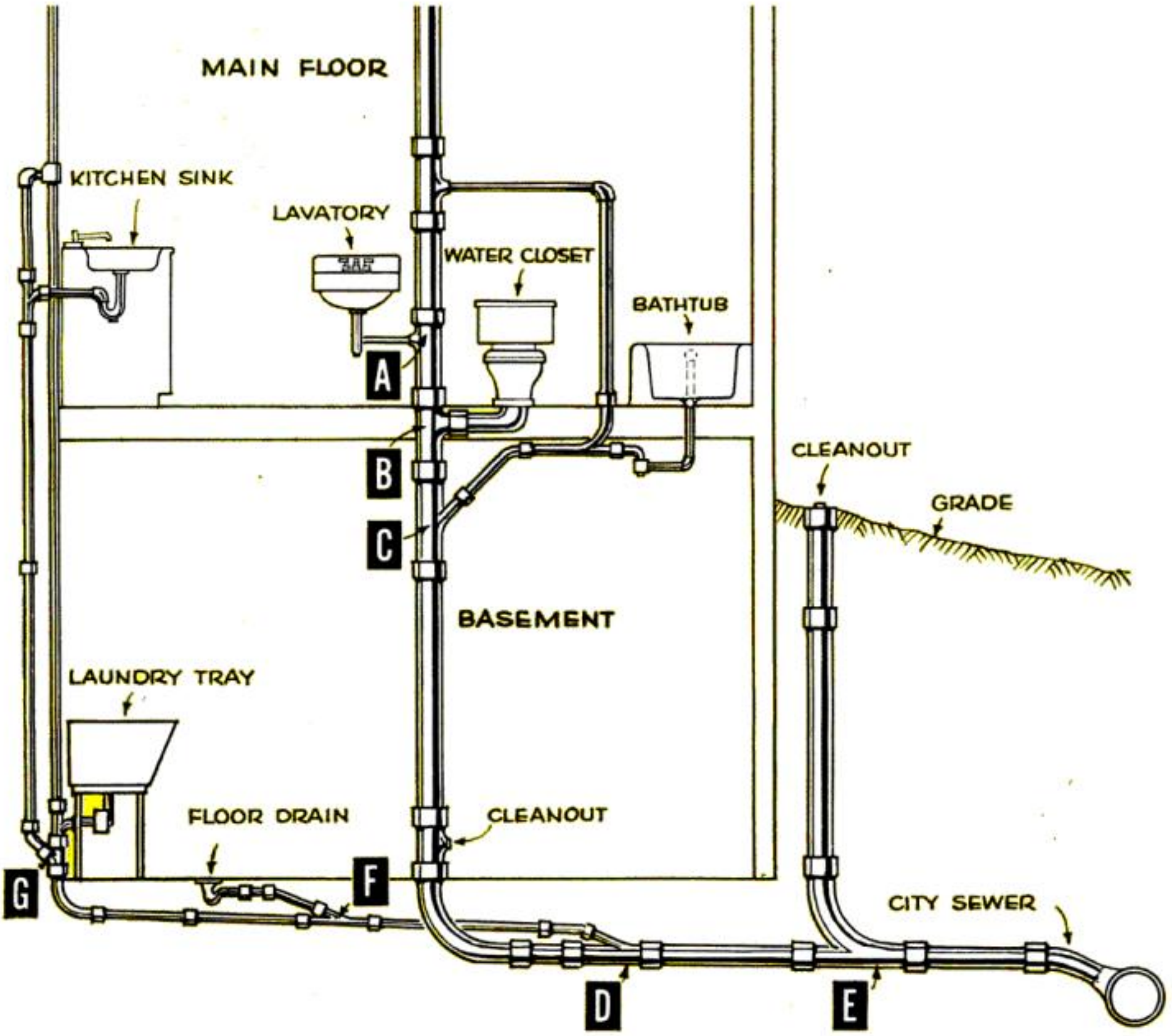
Where's That Drain

This checking chart and diagram

By LOYD WEAVER

When you face the problem of opening a plugged drain line, there's no need to dismantle every fixture, trial-and-error fashion. A brief study of the plumbing fixtures in your house, and their relationship to each other, will enable you to pinpoint the trouble area. Once you can mentally picture the relative positions, or have roughly diagramed the system on paper, locating stoppages is simple—a matter of determining where it's possible for the drain water to go.

The system below is typical of a one-bathroom dwelling with laundry tray and floor drain in the basement. The fixtures in your home—whether all on one floor, or on three—have the same relationship to each other as those in the drawing. Consider any fixture that's above another to have piping



Urheberrechtlich geschütztes Material

Stoppage?

will help you spot it

somewhat similar to that of the kitchen sink above the laundry tray.

The accompanying trouble-shooting chart tells you how to carry on from there.

Having determined the stoppage site by orderly deduction, you'll know whether to run a sewer rod or (for small pipe) a sink cable. And you can go directly to the insert point near the stoppage. Where there's no clean-out plug for an inlet, remove the trap from the closest upstream fixture.

SYMPTOM	LOCATION OF STOPPAGE
Water closet overflows	No tub-flooding—stoppage is above point C. Lavatory drainage doesn't raise toilet bowl water level—the stoppage isn't in main stack. It's in bowl or between bowl and point B.
Bathtub won't drain	Water flushed from toilet doesn't rise in tub—stoppage is between tub and point C. Flush water rises—stoppage is between C and D. Stopped below point D, water won't rise in tub; it comes out basement drain.
Only the lavatory won't drain	Strictly local, since any clog below point B would send lavatory water up into the tub and toilet bowl.
Basement floor drain overflows	Water gushes up when someone flushes toilet—there's a main stoppage below point D. Flushing has no effect, but turned-on laundry tray tap drains into cellar: stoppage is between points F and D. If nothing raises water level—stoppage is local, in the floor drain itself, and there's a basement leak.
Laundry tray overflows	No water comes up into tray when water is run into kitchen sink—stoppage is local (not below point G). Kitchen water does flow into laundry tray—drain line is plugged somewhere between points G and F.

Note: Although rare, two other possibilities are trap stoppages and city-sewer stoppages. Traps are readily opened for inspection and cleaning. To confirm sewer stoppage, check with your neighbors.

SHORT CUTS AND TIPS
FROM PS READERS

File tang makes emergency wrench

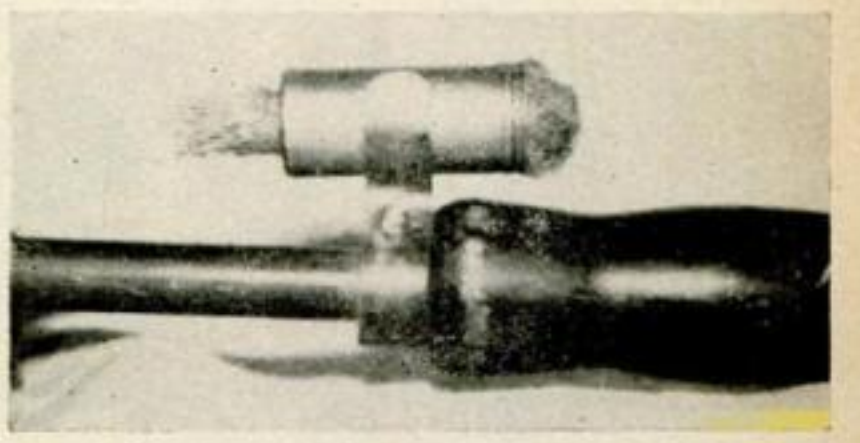
As an emergency substitute for an Allen wrench, try the tang of a three-cornered file. Because file tangs taper almost to a point, it may be necessary to remove a portion of the end to attain proper fit. But that's easily accomplished through grinding. Most tangs are annealed and can be bent for leverage.

C. Phillips, Corning, N.Y.

Cement pads knickknack bases

Because the top of our radio was getting badly scratched by some small glass ornaments kept there, I coated the bases of the knickknacks with rubber cement. Two coats eliminated the roughness as satisfactorily as if I had applied those felt pads that are sold for the purpose. In my opinion the cement has a tidier appearance, too.

A. Weber, Edmonton, Canada.



Clip-on scratch brush stays with iron

Forever finding myself without steel wool or a wire brush when tackling soldering jobs, I made myself a cleaner that travels with the iron. It's a short piece of tubing with rolled screen wire jammed into one end and steel wool stuffed in the other. I bent a strip of metal for a clip and clamped it onto the iron with a nut and bolt.

Peter Legon, Malden, Mass.

Urheberrechtlich geschütztes Material

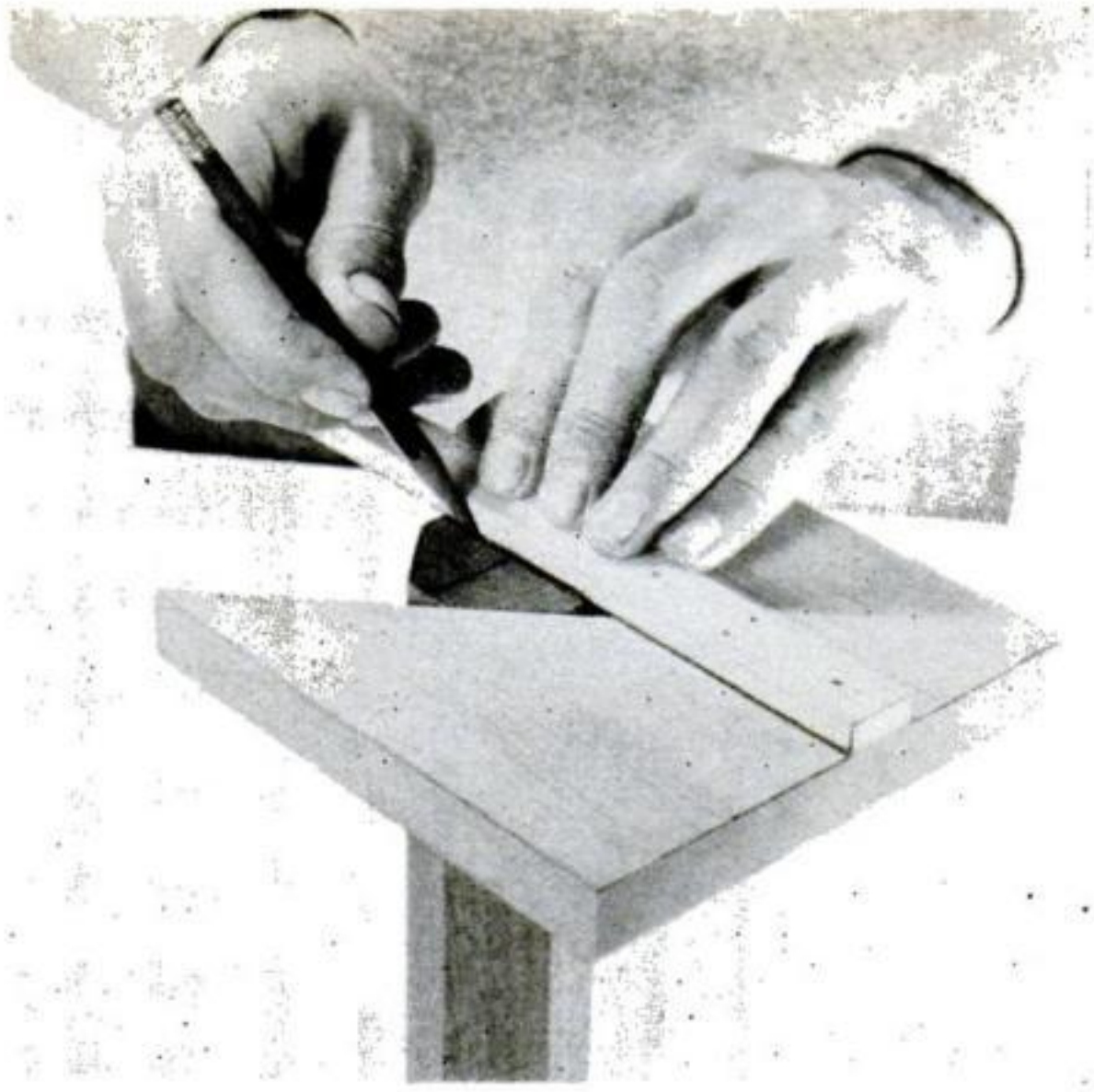
SHORT CUTS AND TIPS

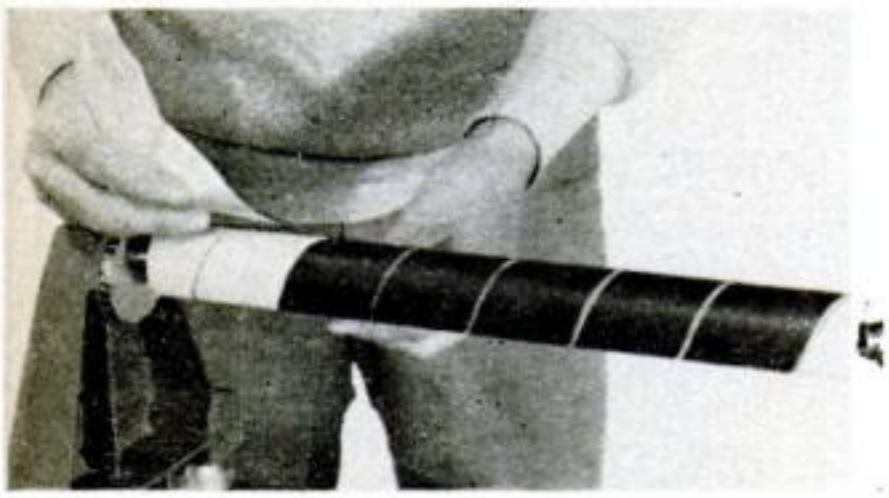
FROM PS READERS

Center finder for lathe and drill-press work

Make a center finder by cutting away a 90-degree V from a piece of wood about 7″ square, then nailing a strip in place so one edge bisects the V. The tool can be used on round, square, or octagonal stock. Place the stock in the V notch and draw a line across the end of the stock as shown. Two such diameters or diagonals will intersect at the center of the stock. The V block is invaluable for lathe work and concentric drilling.

R. J. De Cristoforo,
Los Altos Hills, Calif.

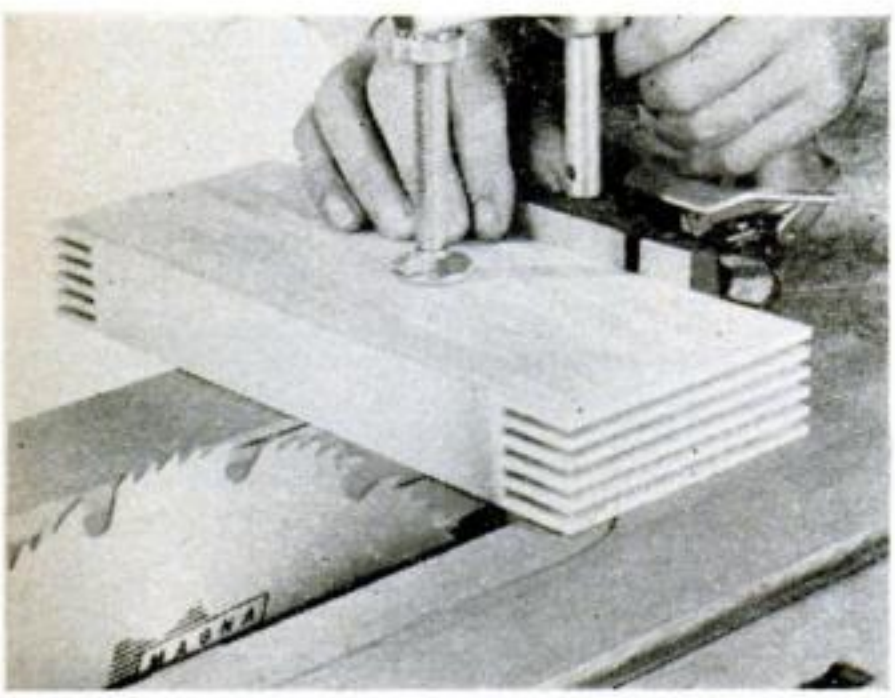




Paper strip helps draw accurate spiral

An easy way to lay out an even spiral around a cylinder is to wrap a strip of paper around it and mark the cylinder at one edge of the paper. Cut the paper strip the width of the distance you want between the grooves. To adjust the pitch of the spiral, change the angle of the first turn around the cylinder. For a tapering spiral, cut a long wedge-shaped paper strip.

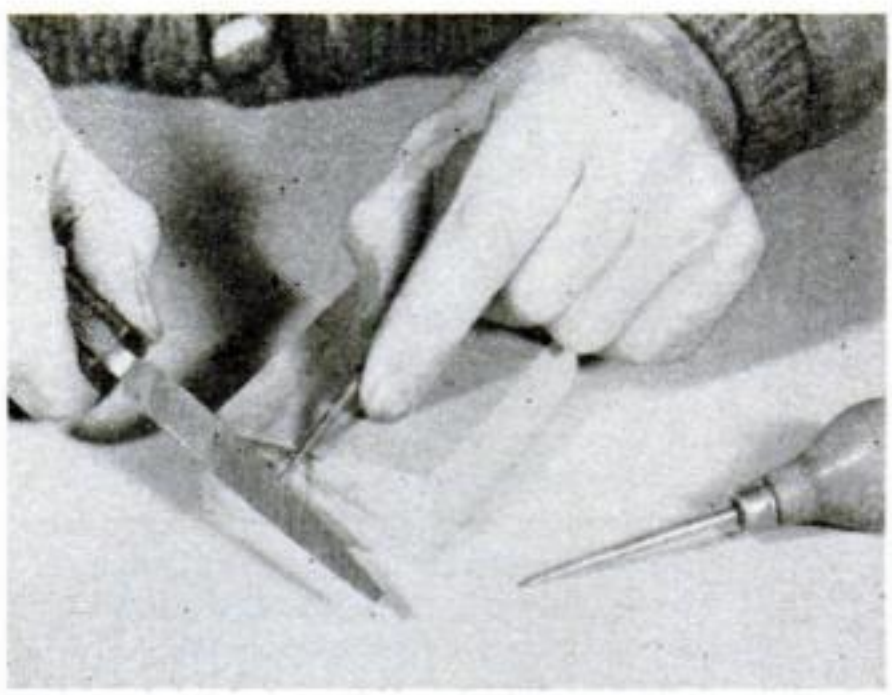
Stuart Lewis, Stamford, Conn.



Easy way to make wood-joint splines

Very often, splines for reinforcing glued joints should be cut with the grain across the width to give strength to the joint. One way to do this is to groove the ends of the stock as seen above, and then crosscut to free the splines.

B. Powell, Norwalk, Conn.

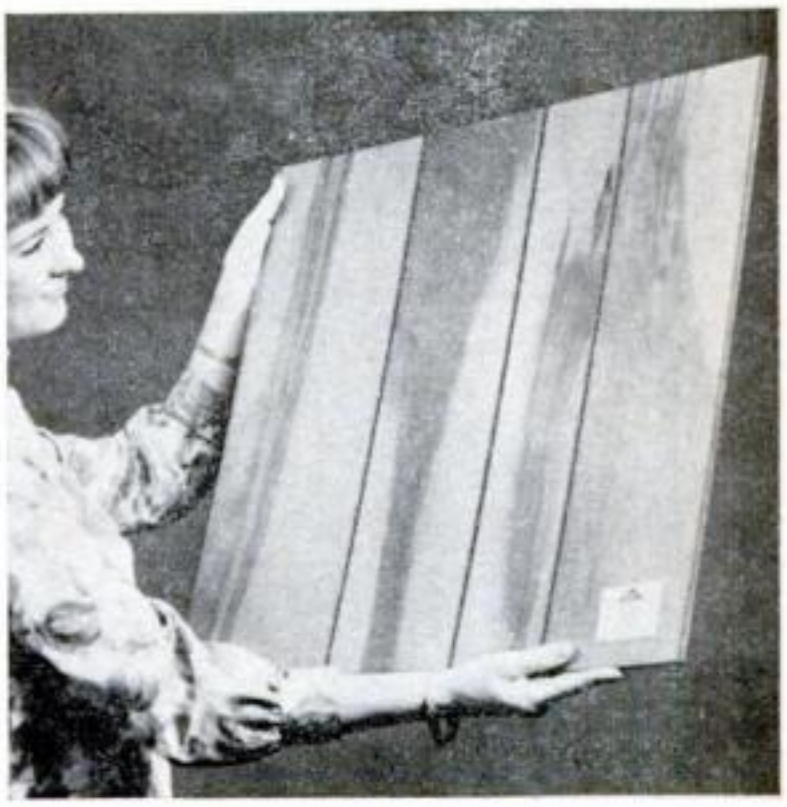


How to get more punch out of your awl

Punching holes is easier if the tip of the awl is filed to make it triangular in cross section. Extend the flats back about ⅛″ from the point. The sharp edges provide a reaming action on the work when the tool is rotated.

Walter Burton, Akron, Ohio

Urheberrechtlich geschütztes Material



Remodeling? Here are two new types of wall paneling you can use

You'd never peg as hardboard Masonite's random-grooved Pecky Teak (above, left). It looks like very old wood of a mellow brown, comes in four-by-eight panels under the Royalcote label.

Plywood faced with handsomely marked gumwood (right) is the latest from Georgia-Pacific. Called Chateau flame gum, it's grooved, with strong grain variations, and permanent finish.

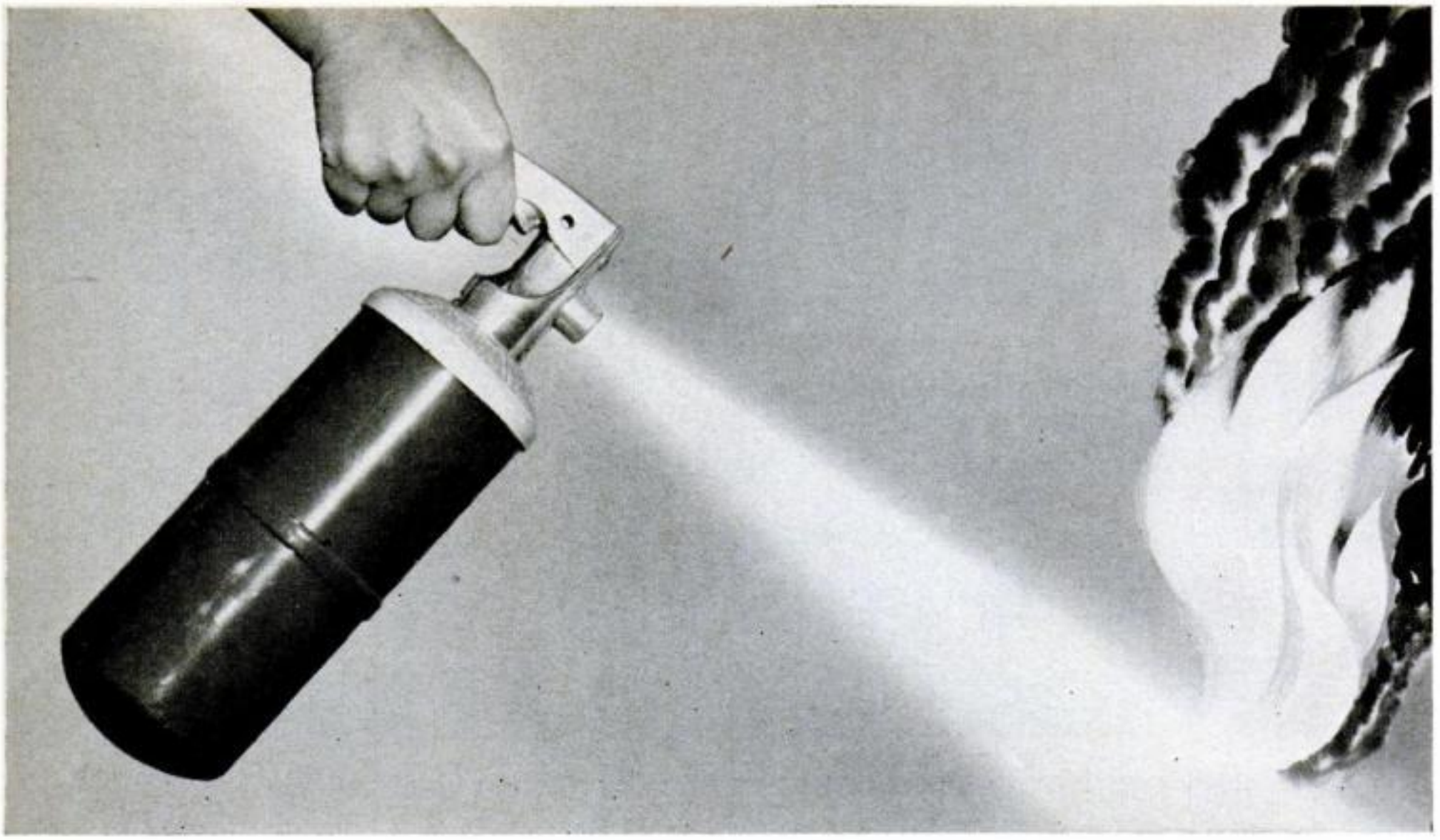
Inside-out garbage disposal

Stuff a kitchen garbage disposer won't swallow can be disposed of slickly if you build in a Can-B-Gone—a metal cabinet that fits between wall studs. Chuck things as large as a gallon bottle through its inconspicuous wall door (above, right) and they drop into a plastic bag that's removed through an outside door (left). Amenity Products Co., Glendora, Calif.

Pin-up tree for Christmas cards

This 5½-foot-high tree of green kraft paper is adjustable in size—it can be unfolded to hold from 20 to 100 Christmas cards. Attach the cards with stickers supplied, and the resulting collage hung on a wall will add holiday color to any room in the house. The re-usable tree costs $2. Paragon Mailings, Box 3333Y, Grand Central Station, NYC 10017, sells it.

Urheberrechtlich geschütztes Material



One Extinguisher

Are you carrying enough fire insurance? You're not if you don't have a fire extinguisher when and where you need one—in the kitchen, shop, car, or boat.

It's no great financial burden nowadays to store modern dry-chemical extinguishers in all of these areas. Recommended by the Coast Guard for use aboard boats, these compact and lightweight extinguishers are most effective against the most dangerous fires—Class B (flammable liquids) and Class C (electrical) fires—two types of fires that water only spreads.

The dry-chemical extinguisher is also successful against Class A (wood and paper) fires, but only moderately so because of limited capacity. Here, the old standby—water—is still quite adequate.

How it operates. The dry-chemical extinguisher for home use on localized fires usually carries a charge of 2½ to 2⅝ pounds of monoammonium phosphate treated with silicones and stearates to make it free-flowing and moisture resistant. When you deactivate a safety device and squeeze the handle, a gas seal is broken and a carbon-dioxide or compressed-air charge forces the chemical out. This charge may project the powder 10 to 15 feet. However, operating range should be restricted, if possible, to about four feet.

All extinguishers work by cooling the fire, by smothering it, or both. The dry chemical has some cooling effect, but its basic action is smothering.

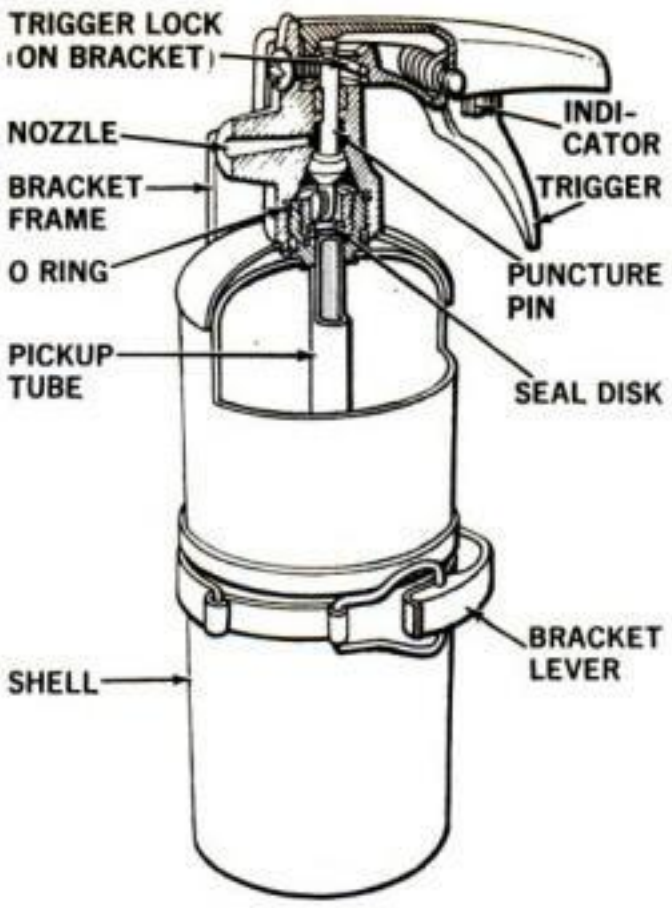
Selecting the right extinguisher. What do you look for when buying?

- First and foremost is an Underwriters Laboratories label, showing approval for use in Class B and Class C fires.
- Second is the presence or absence of a pressure indicator. This type of extinguisher is usually quite stable. If unused, its pressure should hold up for five years and more.

If it has a gauge—and this lets you know at a glance if the extinguisher is shipshape—it should indicate "fully charged," "ready," or pressure of 150 pounds per square inch. Pressure should be checked at least once a year. If ever used, and even though it reads in the "ready" range, the extinguisher should be charged anew.

You'll also find an indicator button on some extinguishers to show the charge. If not supplied with a gauge or indicator, the

Urheberrechtlich geschütztes Material



Examples of dry-chemical fire extinguishers now available are shown here. To control a small fire, you just squeeze the handle of the model on the facing page. To recharge it, you unscrew the used cylinder as above and replace it with a factory-filled spare. The sketch shows what's inside. These extinguishers are best for flammable-liquid and electrical fires. They'll handle small wood fires, but for any large fire you still need to call the firemen.

A pressure gauge keeps tab on the state of the charge in some extinguishers. The one above is made of aluminum to keep the weight down.

Controls All Fires

cylinder can be weighed. A loss in weight of ¼-ounce or more indicates the need for a recharge.

- Third, do you have to find a dealer in such equipment to get a recharge? Are there recharging kits readily available so you can do it yourself when it's needed?
- Finally, you can look at price with pleasure. They're available from about $8 up, averaging $12-$15.

Other types of extinguishers. Some on the market are not as desirable. They include carbon dioxide, foam, soda-acid, vaporizing liquid and other pumped liquids.

To obtain the effectiveness of a dry-chemical unit with a carbon-dioxide extinguisher, you would need one about twice as heavy, twice as large, and twice as expensive. One company markets both a carbon-dioxide extinguisher for $37 and a similar dry-chemical job for $18.

The carbon-dioxide type, though, has its advantages: The expanding gas penetrates every corner, suffocating every bit of burning material. The foam type is only a little larger and very effective on Class A and B fires, but not at all on Class C fires. The soda-acid and liquid types are very bulky and heavy and only effective on Class A fires.

Vaporizing-liquid type. Stay clear of this —it can be lethal. The charge is either carbon tetrachloride or chlorobromomethane. While the Coast Guard withdrew its approval of this type in 1962, there are some on the market. Vapors from these units are extremely noxious. When used indoors, fumes from carbon tetrachloride have been known to cause illness and death. When this chemical becomes superheated, it turns into deadly phosgene gas.

The beer-can variety of extinguisher that can be purchased for under $1 has its own peculiar hazard: It builds overconfidence. These aerosols have no Underwriters Laboratories approval for any type of fire. Their range is extremely short and their capabilities negligible. Often, too, the charge is carbon tetrachloride.

When these cans first flooded the market, a fire chief decided to test them. After a few trials on a staged fire, he gave up, commenting that a can of beer would do a better job. Backing this judgment, he shook a can of beer, punctured it with an ice pick, sprayed the fire, and put it out.

Urheberrechtlich geschütztes Material

Desks You Can Size to Suit

By R. J. De CRISTOFORO

Build desks by the foot? Sure, why not? That idea occurred to me as I began designing a desk for my two boys who share the same room. The system is based on four elements—a stack of drawers, an open bookcase, a pencil drawer, and a top. Combine them as you wish to solve your own desk problem. Add bookcases and make it a 20-footer. Put doors on one of them to make a cabinet. Style another as a housing for TV or hi-fi equipment.

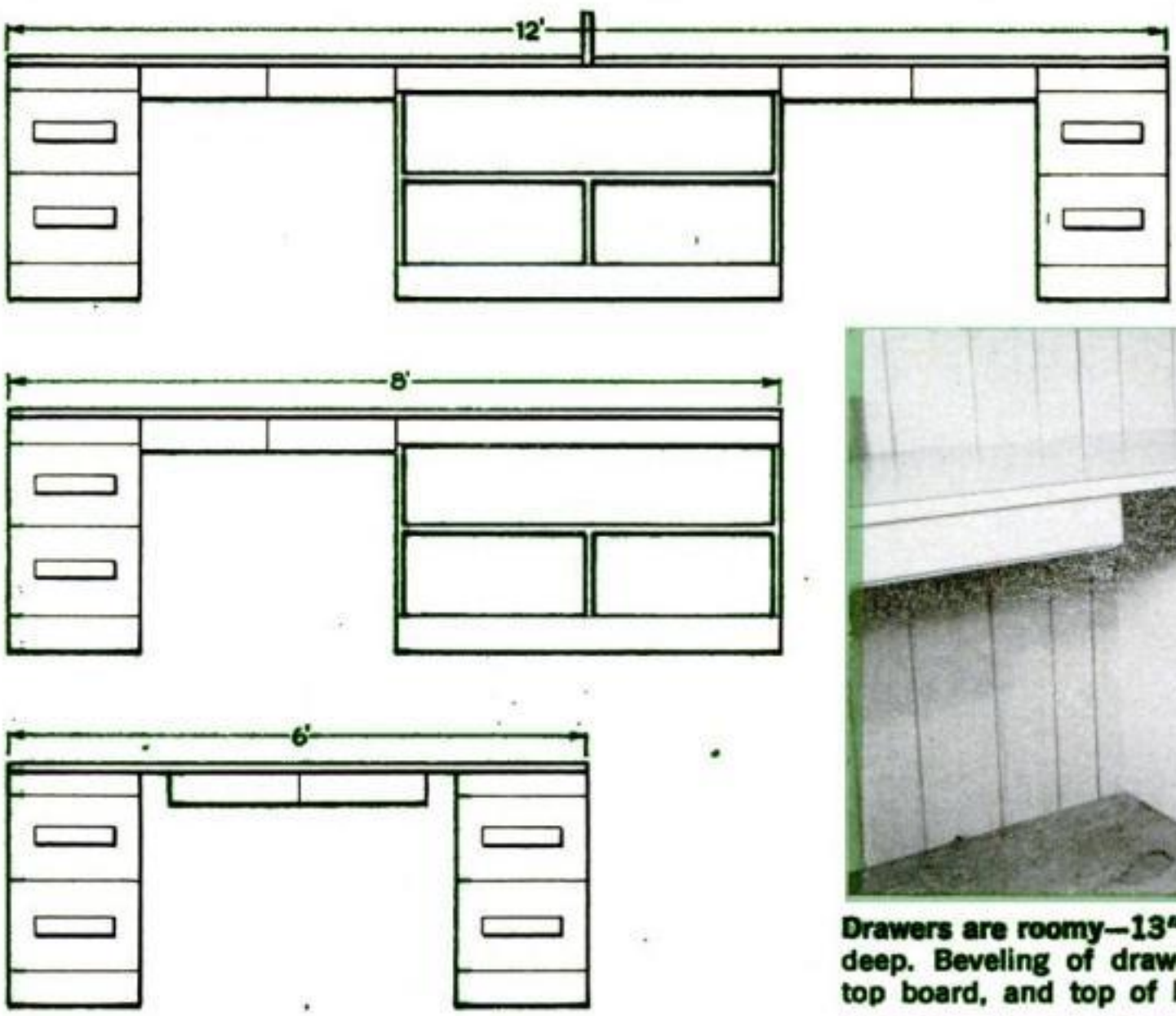
Think of the bases—drawers and bookcase—as separate units and build as many of each as you wish. When they're finished, fasten them to the underside of the desk top with small angle irons and screws. Being underneath, the angle irons are hidden, yet easily removed for disassembly.

To build the drawer units, first make up the sides and rout dadoes for the drawer divider frames. Next, cut the ¾"-by-2"-by-15¼" plywood strips that form the dividers and assemble them with glue and corrugated fasteners. These assemblies must be square, so use a large carpenter's square as a guide during assembly.

After completing the drawer divider frames, coat the dadoes in the drawer-unit sides with white glue and press the dividers into place. Clamps are unnecessary. Just drive in some 1½" finishing nails.

Next, add the top board and baseboard. Coat the mating surfaces with white glue and secure with finishing nails. At this point the case should be sturdy enough for the fitting of drawers.

Urheberrechtlich geschütztes Material



Make your desk long or short simply by building the right base units—bookcases and stacks of drawers made mainly of ¾" plywood. Finished desk comes apart for moving or base-unit rearrangement.

Your Home

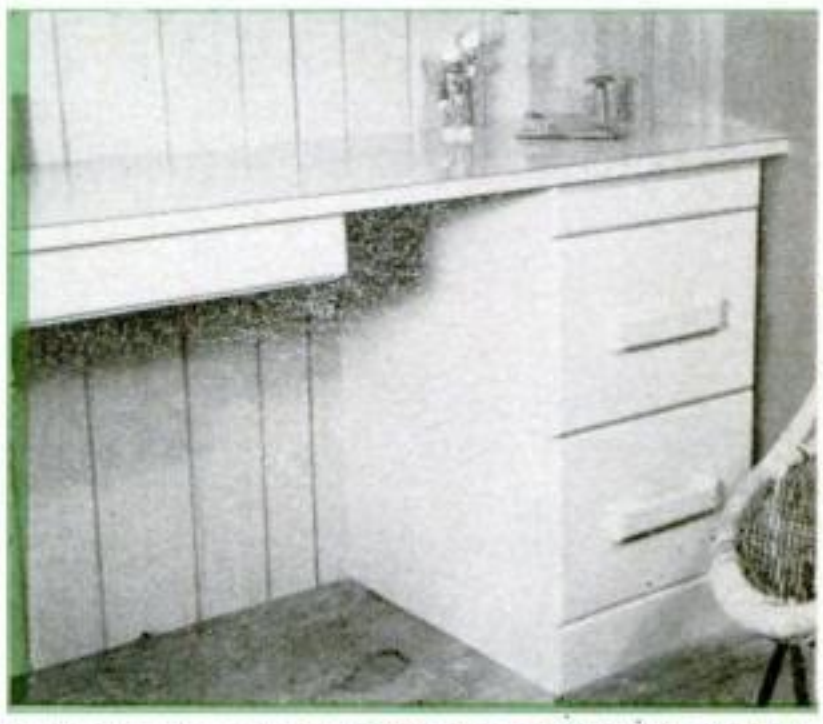
Make the drawer fronts first, putting dadoes in them for the sides and bottom, checking for fit as you do so. Then cut the sides and bottom, assemble the pieces, and hold them together by hand for a final check to see if the drawer fits. The drawer slides and guides are the most critical components. Make sure they're perfectly aligned before fastening them permanently.

To build the bookcase, make the sides first, then the shelves. Assemble them, and cut and add the other three parts.

To make a pencil drawer, start with the case, then cut the pieces for the drawer, checking them for fit in the case before final assembly. The bottom of the case is intentionally less than the full case depth to provide a finger grip for opening drawers.

The amount of material required depends upon the length of the desk you'll build,

Continued



Drawers are roomy—13" wide, 18" long, 8⅝" deep. Beveling of drawer tops and bottoms, top board, and top of baseboard is optional.

Bookcase is 4' wide and vertical clearance between shelves is 10". If you prefer a cabinet instead of open shelves, add doors.

Desk top is ¾" plywood with plastic overlay. Similarly covered desk-top divider establishes center boundary of 12' desk used by two boys.

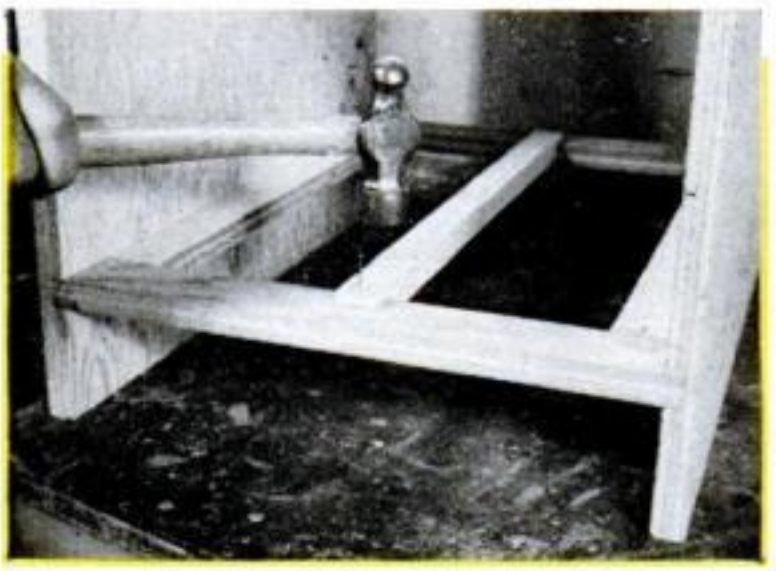
Urheberrechtlich geschütztes Material

plus your choice of base units. Decide these factors. Then, before ordering materials, work out a cutting pattern. I got my 12′ desk, including the 22″-by-12′ top, out of three 4′-by-8′ panels of ¾″ plywood, one 4′-by-4′ panel of ¼″ hardboard, and an odd piece of ¼″ hardboard from which I cut pencil-drawer bottoms.

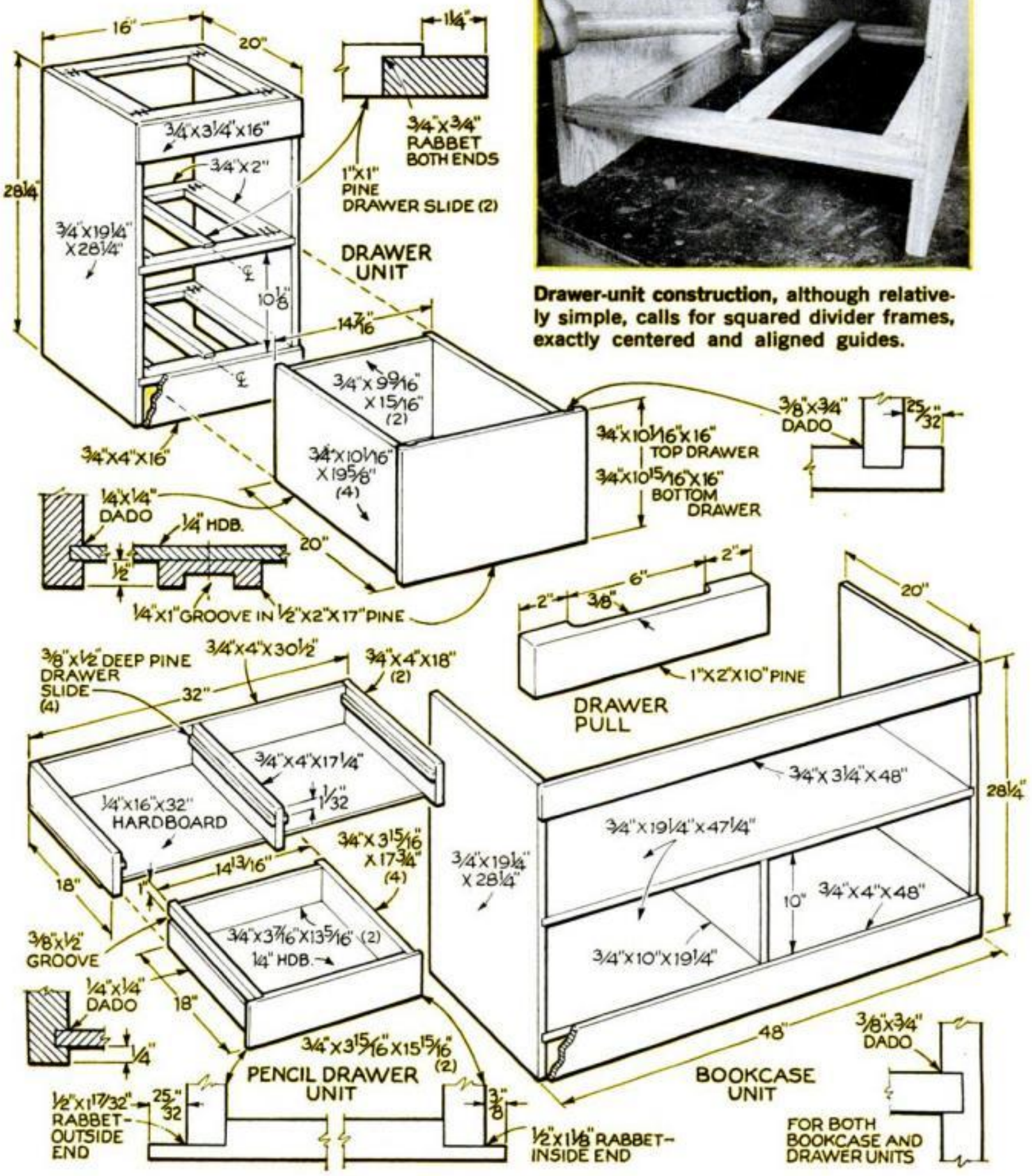
The desk top is as simple as you want to make it. I made and covered mine by applying plastic sheet with contact cement. You can order yours already covered.

I let the top sheet of plastic overlap the banding and dressed up the joint by smoothing the top edge with a file. If you do likewise, attack from above. Hold the file at a 10-to-20-degree angle and—to avoid chipping—cut only on the downstroke.

The drawer-unit and bookcase finish? I filled exposed edges and nail holes, gave the pieces a sanding and dusting, then applied a coat of resin-type sealer. I again sanded after the sealer dried, then applied an undercoat and top coat of paint. PS



Drawer-unit construction, although relatively simple, calls for squared divider frames, exactly centered and aligned guides.



Urheberrechtlich geschütztes Material

Build this fascinating science project

EARTHQUAKE DETECTOR

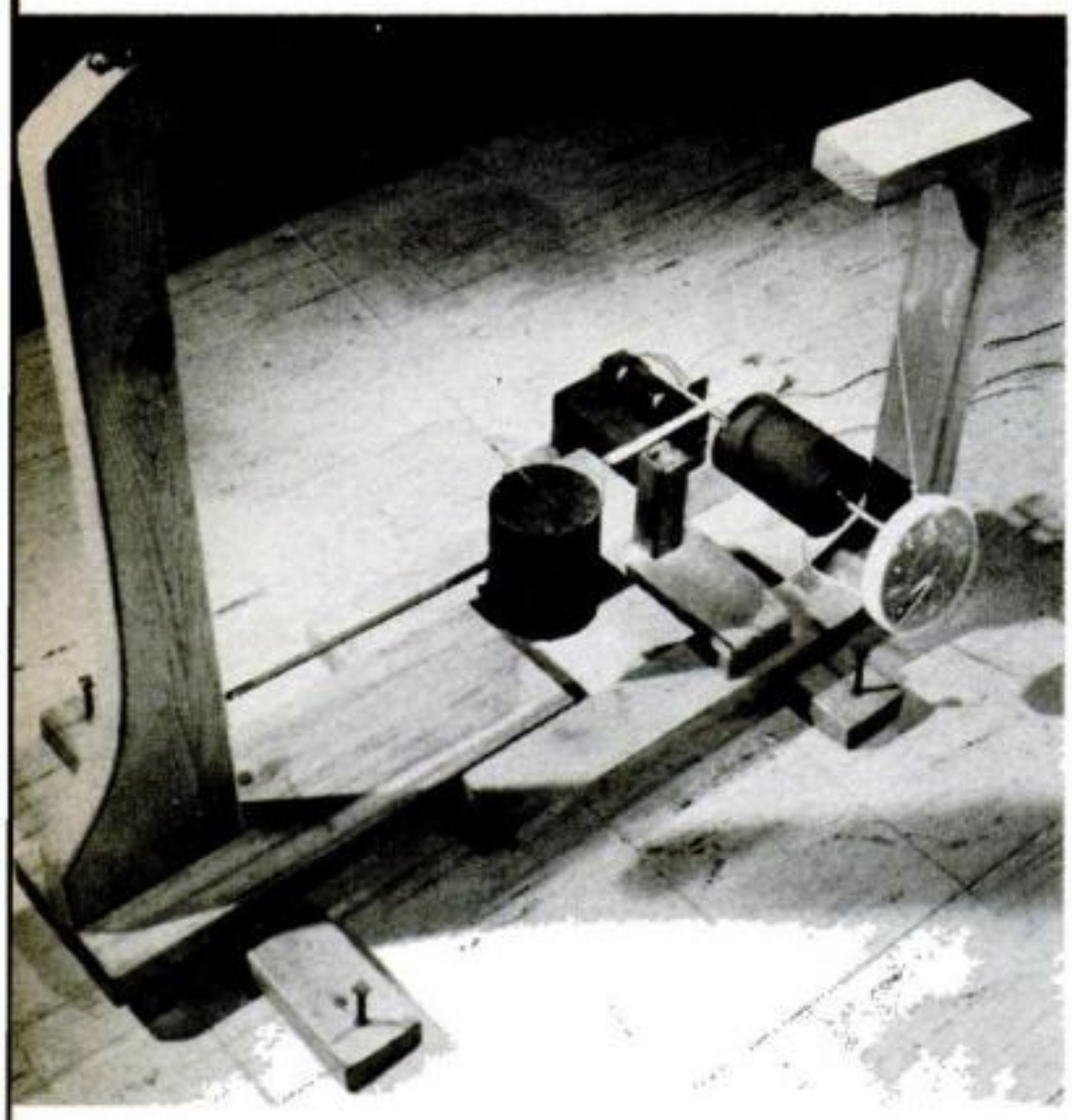
You can record earth tremors up to 5,000 miles away with this instrument. Cost to build: less than $15

By BERNARD W. POWELL

Terra firma—steady earth—the ancients called the ground beneath their feet. They couldn't have been more wrong. Old Mother Earth is very unsteady.

The ground pulses with vibrations everywhere. The most spectacular are earthquake shocks. But moving

Continued



PARTS LIST

Frame: 12' two-by-four pine, 2' two-by-eight pine, 3' two-by-ten pine, wood shop scraps, 4 carriage bolts (leveling screws), screw-eye, cup hook, screws, lag bolts, glue.

Pendulum: automobile-generator shell (from junkyard), cement and sand, ¼"-by18" iron rod, phonograph needle, fine steel wire (fishing leader), 1½" #18 copper wire, straight pin, ¼"-by-½"-by-2" steel plate, 12"-square sheet metal, sheet-metal screws.

Magnifying lever and stylus: strip of sheet metal, medium-weight fishline sinker, sewing needle, 3 straight pins, solder, 4" of 1/16"-bore glass tubing, 4" fine copper wire.

Recording drum: 15" of ¼"-dia. brass rod, clock (old kitchen clock is fine), 1½"-by-2½" strip of sheet metal (iron).

Recording timer: clock, 6.3-volt 1amp filament transformer, roll of #24 magnet wire, 3"-by-1"-dia. wood dowel rod, metal thimble, 2 ounces of mercury (from science-supply store or local pharmacist).

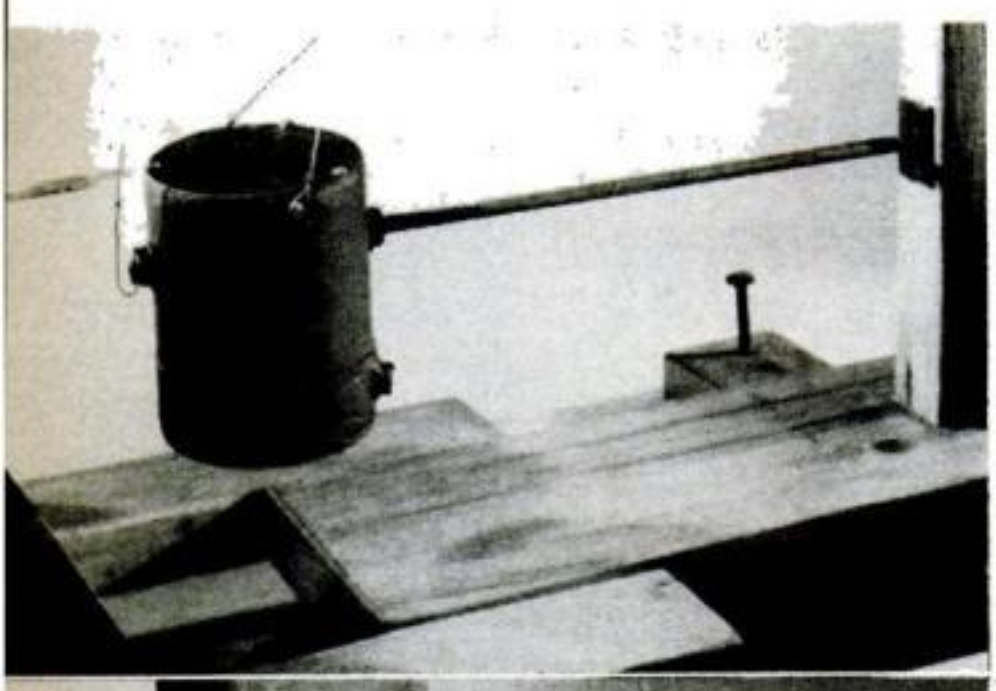
Recording supplies: roll of glazed pantry-shelf paper, kerosene lamp, clear acrylic spray (from art store), rubber cement.

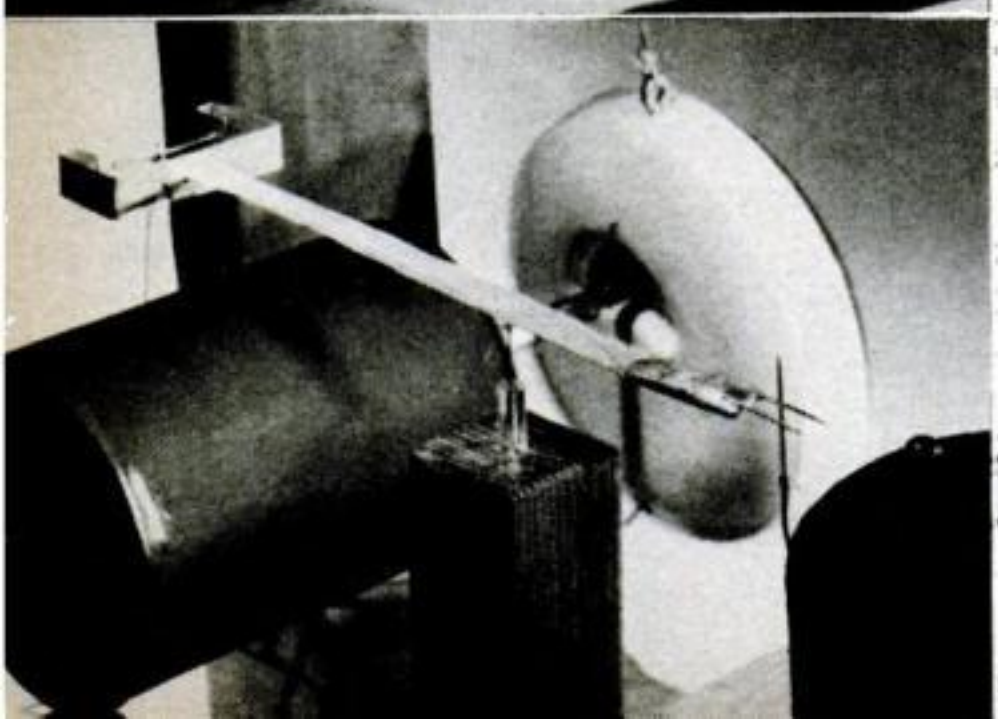
air masses, storms at sea, waves thundering on exposed shorelines, and such man-made sources as vehicles, heavy machinery, and blasting all contribute to the steady production of earth tremors.

Scientists study these earth vibrations to learn about the internal makeup of our planet. Seismologists tune in on the shudderings to discover faults and rock layers miles below the surface, and pinpoint quakes and landslides halfway around the globe.

You can join them by building a seismograph—the instrument that detects and records the earth vibrations. The Modified Bosch-Omori described here is a good instrument for the beginner. It has an average detecting range of 5,000 miles, and on occasion you can bag a quake twice that far away. You'll need a few nights or a

Continued

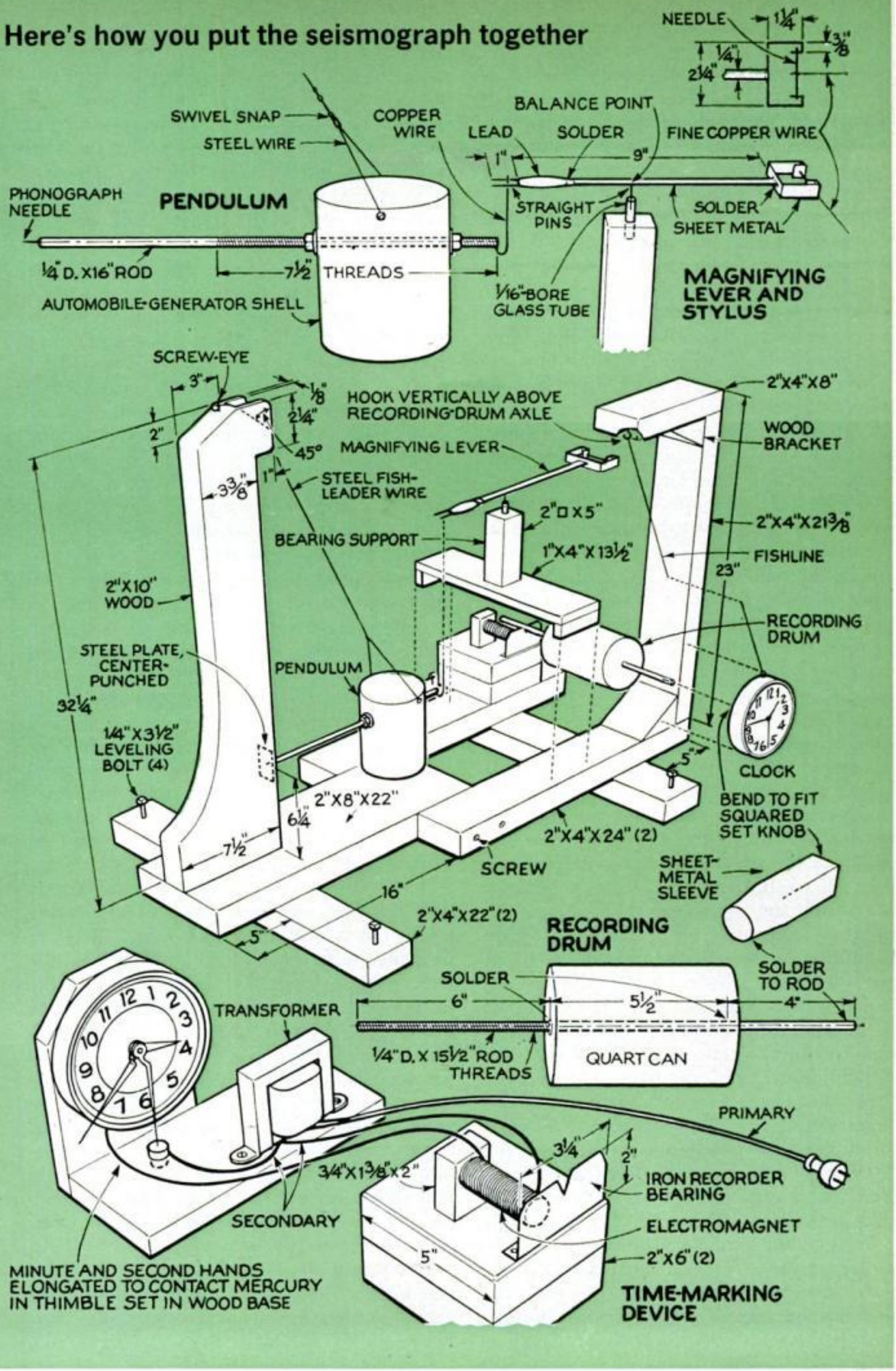




These are the working parts of the earthquake detector

Pendulum (left) hangs almost free in space. When a tremor moves the floor, the frame moves with it, but the pendulum tends to remain fixed. This movement is amplified by the magnifying lever (below, left) and recorded on the drum by the stylus. Run by the set knob on a clock, the recording drum moves under the stylus to make a spiral trace around the drum. Operated by another clock, the electromagnet (below) is activated momentarily to pull the shaft support a bit to one side so that notches are made in the trace to help determine the time a recording is made.

Here's how you put the seismograph together



Urheberrechtlich geschütztes Material

weekend to put it together. Tools in the average home shop are sufficient, and no machined parts are required.

First make the frame. Study the drawing for dimensions. The main thing is to get a strong joint where the main column joins the baseboard. Use long wood screws (even lag bolts if you have them) and seat well in wood glue.

To make the pendulum, thread the iron rod for about 7½", using a ¼" die. Run a nut on when you are done. Now, with a hacksaw, cut a shallow notch in both ends of the rod. At the unthreaded end solder a steel phonograph needle in the slot. This is the needle bearing for the pendulum.

The bob (weight) is made from an old automobile generator. Remove the field coils, armature, and end plate. Cut a sheet-metal disk the same diameter as the shell, and fasten it over one end with light sheet-metal screws tapped into the shell. Make a cover for the other end, but don't attach it.

Push the threaded end of the iron rod through the field-coil bolt holes, and run up a nut to hold the shell loosely in place. Solder the end of a 1½" length of #18 copper wire in the other notch. (Light prick-punch marks will help hold it in place). Solder a common straight pin to the other end of this wire.

A ¼"-by-½"-by-2" steel plate with a light prick-punch mark in the center is screwed to the main column as the bearing plate for the phonograph needle. The punch mark must be 6½" above the top of the base.

Balance the pendulum. Put a heavy coat of grease on the threads of the pendulum shaft inside the generator shell. Place the pendulum assembly on a bathroom scale and fill the shell with cement until it weighs 12 pounds. Add scrap iron for additional weight if needed. Too much weight will blunt the phonograph needle and ruin your instrument's sensitivity. Try to hold to 12 pounds. Don't go over 15 pounds. When the cement is set, screw on the other cover.

Now hang the pendulum and adjust it for its period of vibration. This is the time required for a complete swing from one side of the instrument—about 12" from the center—over to the other side and back to the starting position. This must be 14 seconds. To decrease the period, move the shell toward the column. To increase the period, move it away from the column. When you get 14 seconds, secure the shaft nuts.

Magnifying lever and stylus. The magnifying lever is made from strips cut from sheet metal (if you want a nicer looking instrument, use scraps of copper gutter flashing which you can get at any plumbing shop). Cut two strips ¼" wide: one 4" long and another 10" long. Solder the lead fishline sinker to one end of the 10" strip. With an awl or small drill, make a tiny hole near each end of the 4" strip. Bend this strip as shown and solder it to the other strip on the end opposite the weight.

Push a sewing needle through the two holes, as shown, and make the stylus by soldering a short length of fine copper wire to the midsection of the needle. Leave a bit of wire opposite the recording end to aid in final adjustment of the instrument.

With a sharp knife, cut two parallel grooves (about ¼" apart) in the fishline weight and insert two straight pins. Solder them in place. These are the contact transmission points of the magnifying lever.

Find the exact balance point of the entire lever assembly by balancing it on a razor blade. At the balance point, solder a straight pin to the underside of the lever arm. Carefully recheck the balance point when you are done. If you are off a bit, counterbalance by adding drops of solder to the light end.

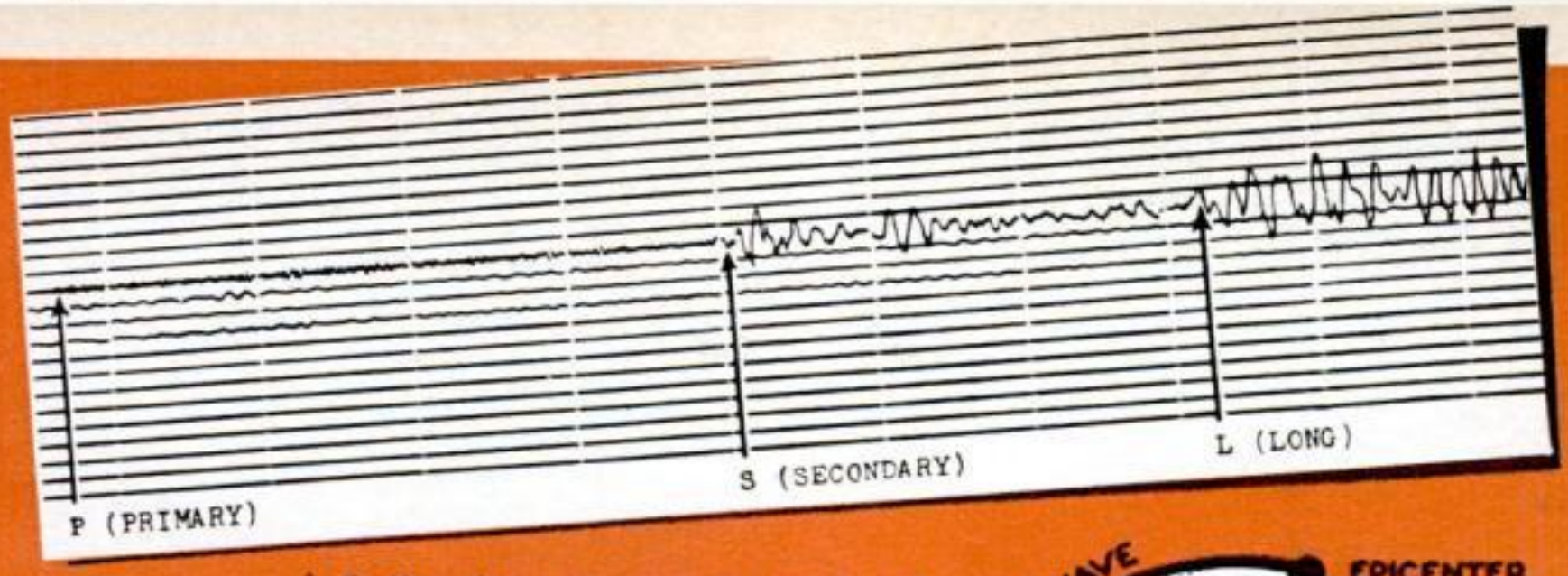
In use, the stylus is slightly overbalanced. Do this by snipping off a bit of the surplus wire you left opposite the recording end. The recording end, which rides on the recording drum and makes the trace, must be as friction-free as possible.

The bearing for the magnifying-lever support pin is made from glass tubing having a 1/16" bore. Seal one end in a gas flame (a propane torch works fine). Nick the tube with a triangular file about ¾" from the heat-sealed end, and snap off the sealed piece. The broken edges may be fire-polished in the torch. Mount this bearing in the wood support and fasten to the wood braces as shown. Place the assembly on the wood braces—don't fasten it. By trial and error, position it so that when the pendulum is swung to one side, the upright pin will pass clear of the two pins on the magnifying lever, and come back in between them on the return swing.

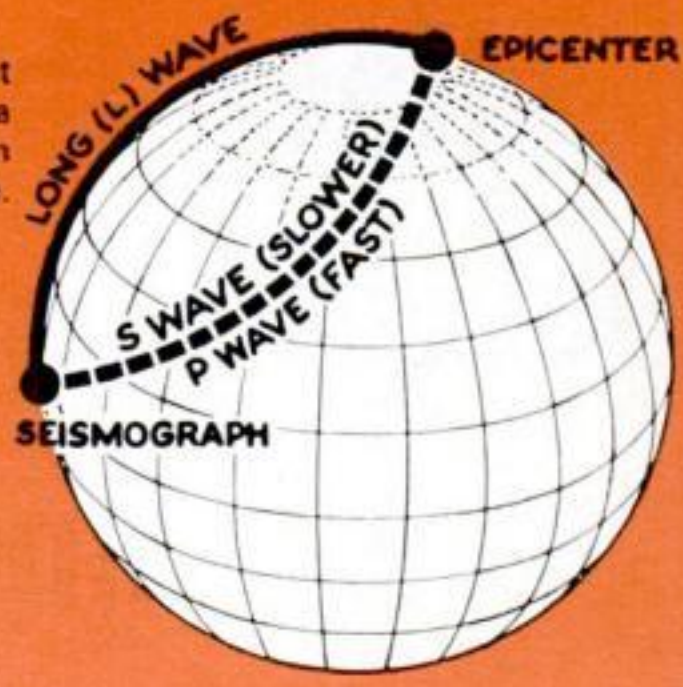
Recording drum and drive. Any quart can makes a good recording drum; I used an old antifreeze can. Cut holes in the ends big enough to take the ¼" brass rod.

[Continued on page 188]

Urheberrechtlich geschütztes Material



Earthquakes, in general, send out three kinds of waves. Each records a characteristically different wave form on the seismogram, as shown above.



How to interpret EARTHQUAKE RECORDINGS

Earthquake waves start out from the epicenter at the same time, but different types travel at different speeds. Hence, the P waves will show up first as small squiggles on your chart. Later, the larger S waves begin to register, and finally the big L waves—sometimes hours later—go rolling across your seismogram.

From the chart below, use the S minus P interval, or difference in time of arrival of the S and P waves, to figure the distance. Suppose the difference in time between the onset of the P waves and the S waves is six minutes 30 seconds. Under the S—P column on the Wave Interval Chart, you'll find it corresponds to a quake 3,000 miles away. You can do the same with L—P.

Next look up 3,000 miles on the Travel Time Chart. It shows that P waves take eight minutes to travel this distance. Therefore, the time of the quake *where it occurred* is eight minutes before the first P wave registered.

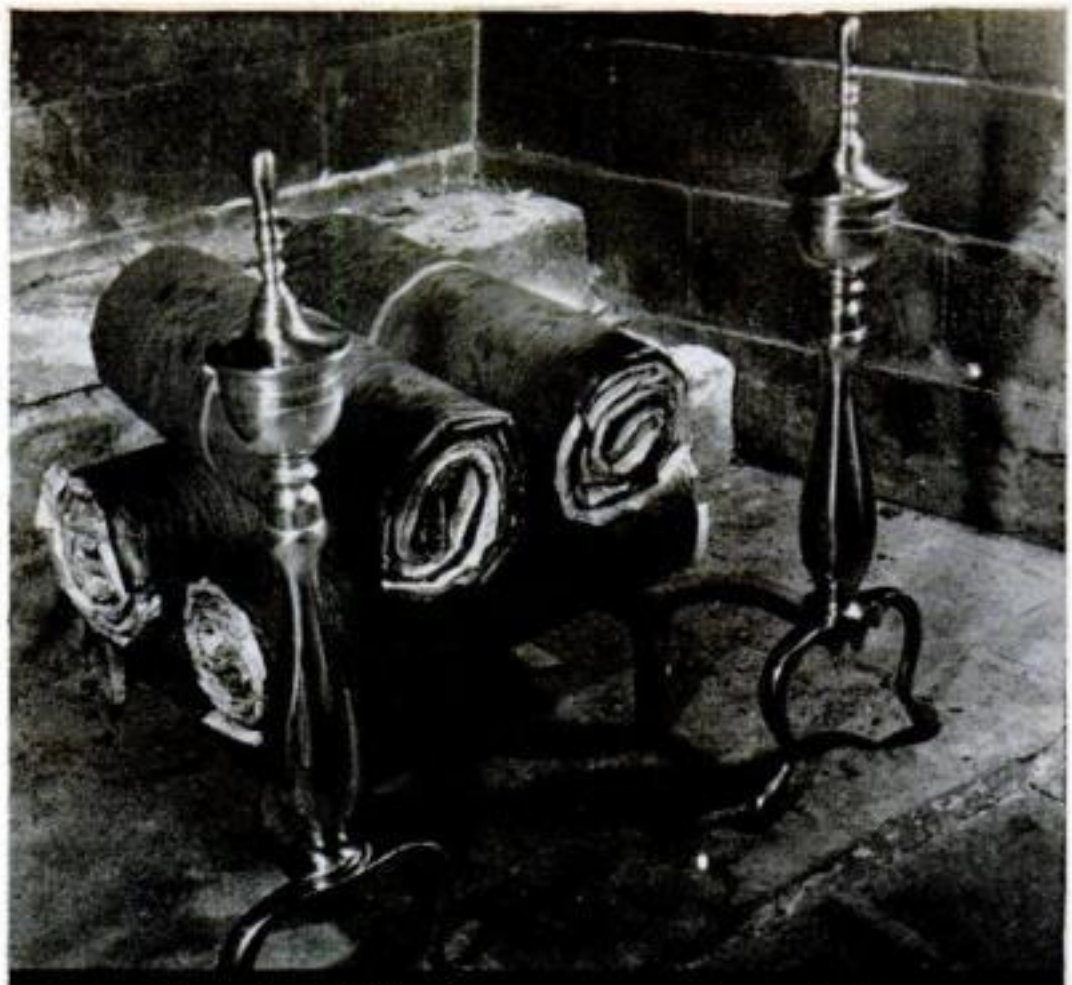
Draw an arc on a map using the distance to the quake as the radius from your station. Somewhere along this arc is where the quake occurred.

To pinpoint the epicenter, you need a reading from one or two other stations to give a cross-bearing on the quake. Thus, you need to be in touch with others who, like yourself, are building and operating a station. To establish these contacts, write to Rev. Victor J. Blum, S.J., Dean, Institute of Technology, St. Louis University, Box 8020, College Station, St. Louis, Mo. 63156. Father Blum will place your name on an active list of amateur seismologists who exchange instrument readings and other data. You'll receive a copy of the list too.

MILES FROM SOURCE	WAVE INTERVALS				TRAVEL TIME					
	Time Between P and S (S—P)		Time Between P and L (L—P)		Travel Time P		Travel Time S		Travel Time L	
	Min.	Sec.	Min.	Sec.	Min.	Sec.	Min.	Sec.	Min.	Sec.
100	0	20	..	..	..	27	..	47	..	..
1,000	2	45	4	0	3	20	6	0	7	20
2,000	4	52	8	20	5	56	10	48	14	16
3,000	6	30	13	30	8	0	14	30	21	30
4,000	8	0	18	0	9	50	17	50	27	50
5,000	9	25	24	30	11	26	20	51	35	56
6,000	10	44	29	0	12	43	23	27	41	43
7,000	11	49	35	20	13	50	25	39	49	10

Urheberrechtlich geschütztes Material

NEWSPAPER LOGS Keep the Home Fires Burning



Warmth and firelight for cozy evenings at home cost you nothing when you burn "logs" made of old newspapers. They're easy to roll and look neat. The four logs stacked on the andirons above will burn for more than an hour and a half.

A simple tool you buy disposes of waste paper and gives you free fuel

By HARRY WALTON

A strange little gadget hanging from our mantelpiece gets rid of lots of old newspapers for us—the fun way. It rolls them into "logs" to burn in the fireplace.

Before we found Rolog, newspapers piled up so fast it was a tedious chore to take them out. They filled trash cans to overflowing. Now we fold the papers the long way, stack up a thin pile, and slip one end of the pile into the Rolog, a forklike device made of two pieces of tubing. The pile is rolled up tightly into a fat little log, and held with a twist of wire. When the Rolog is withdrawn, it leaves two holes inside the paper log. Those holes are the secret of burning the newspapers.

We stack four logs at a time on the andirons, the top two crisscrossing the others. A loose wad of paper underneath starts them burning—no kindling or liquid starter fuel is necessary. Soon, gas generated inside flares at the ends of the two air channels, which aid combustion of the outer layers so that the logs burn all over.

It's no roaring Yule-log blaze, but we get enough heat from our paper fire to take the chill off cool spring and fall evenings. In winter, we like the visible warmth it adds to the furnace output, and the fascinating play of flame figures.

You'd think a paper fire like that would soon burn out. But the four logs keep going for more than an hour and a half. Occasionally you have to push the logs together as they burn back, just as with wood.

Here's what you get in deluxe kit: brass Rolog, 250 binders, and wood-grained wrapping paper—about $10. An aluminum tool with 12 binders is $5; a plastic tool and 12 binders is $3. At shops or from Rolog, Box 1122, Santa Barbara, Calif.

Urheberrechtlich geschütztes Material

Surprisingly little burned-paper smell emerges if the fireplace has a good draft. There's more odor if you let the logs go out and smolder on the inside. To prevent that, I stand half-burned logs on end and douse them with water. Next time I want a fire, they're dry enough to use again.

Though any thin wire can be used for binding, the red, ribbonlike ones furnished add a touch of color. But the last word is a wood-grain-printed paper supplied with the deluxe set or as an extra. Wrapped in this, the paper logs look nice enough to leave stacked on the andirons, ready for a match.

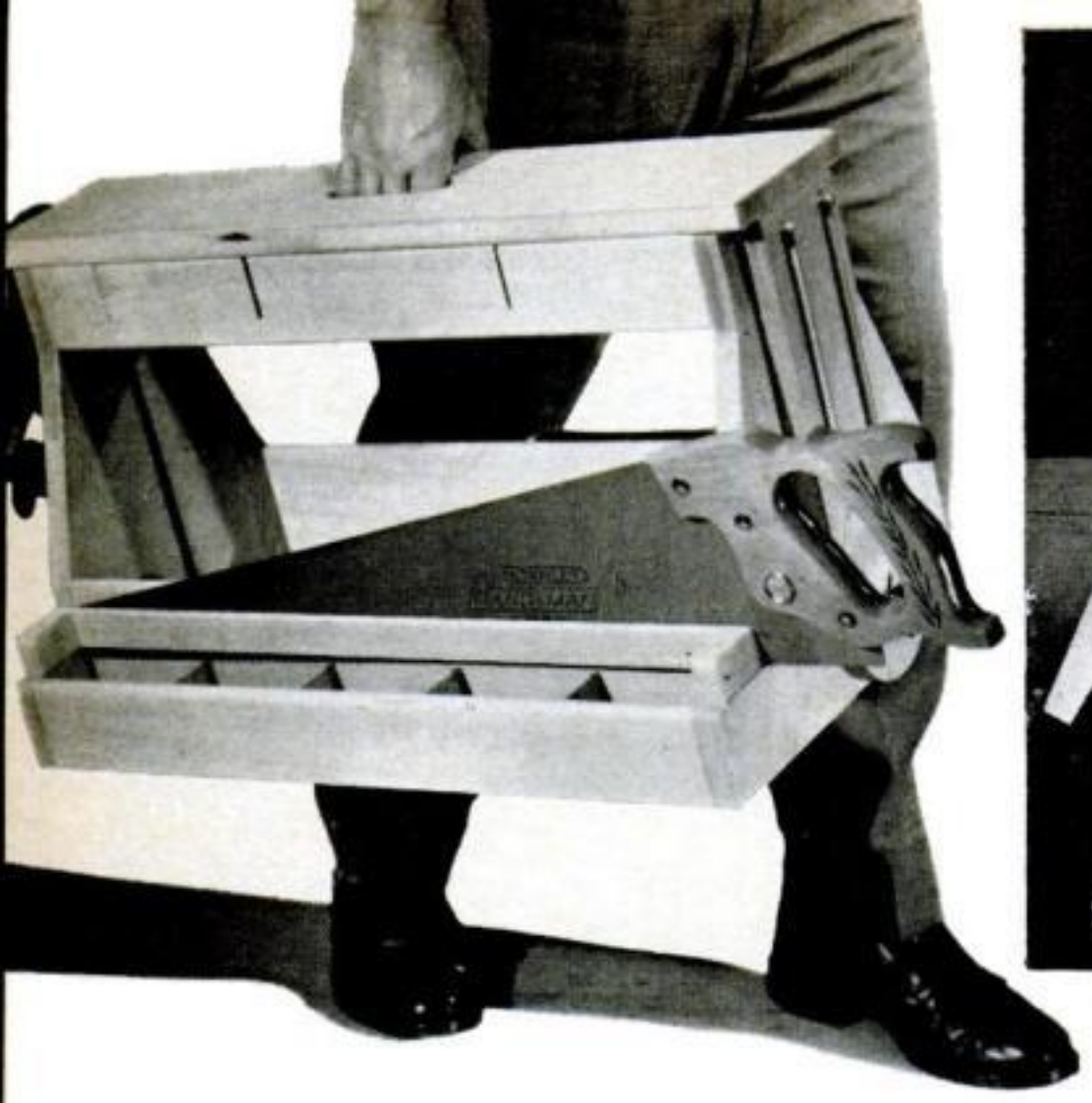
The idea began with somebody's grandfather, who made a slotted stick to roll paper into logs. The grandson started a back-yard factory, first making and selling the same stick type.

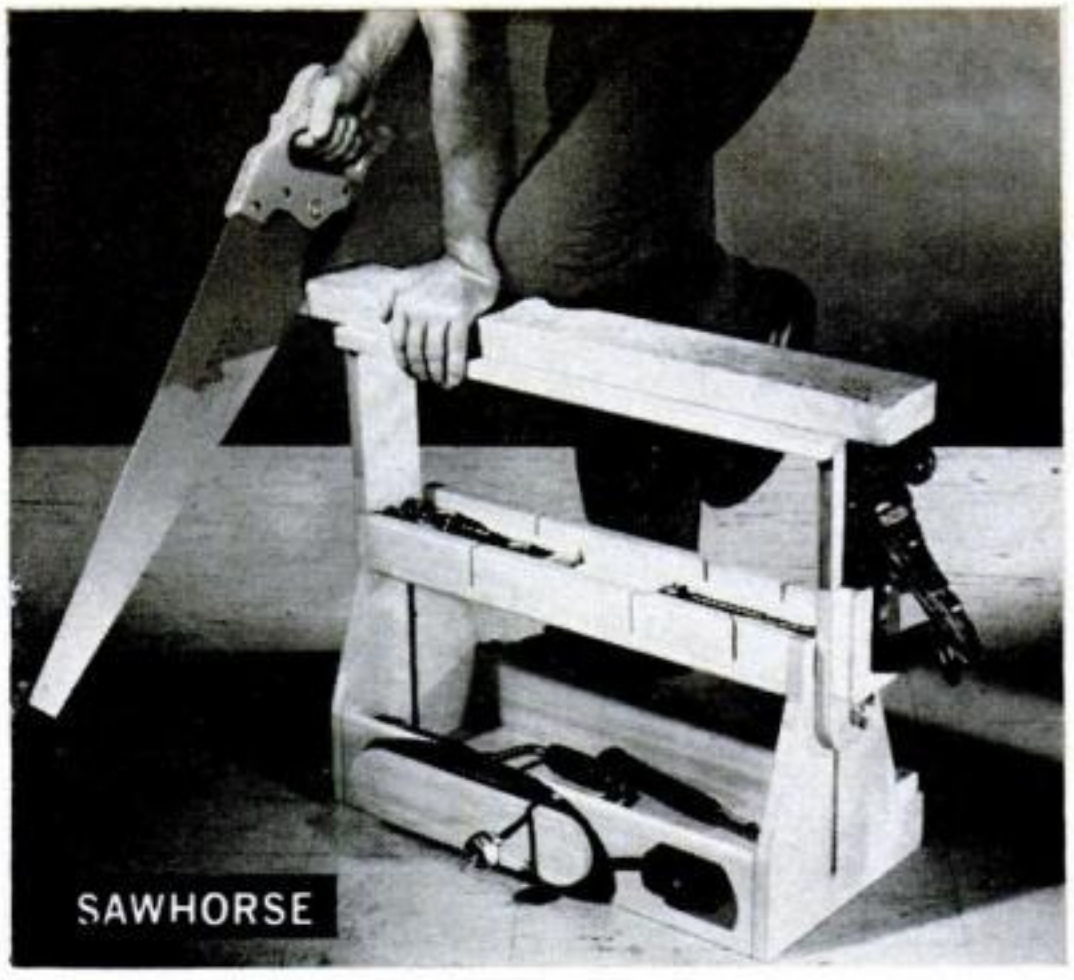
But today's Rolog is sleekly styled of metal or plastic tubing, a walnut handle, and a handsome ring fitting. It's attractive enough to hang up by the fireplace, becoming a conversation piece when curious friends ask, as many will, "What's that for?"

Papers are opened and refolded the long way, four or five sheets in a group. Folded edges of groups are alternated, until pile is about ½" high. The bottom group is pulled out 5" and the tool slid on 6" from the other end to pick up the entire pile.

The pile is evened up, then rolled tightly. Here the wood-grained wrapper has been rolled in. Another way is to bind the log first, then put on the wrapper with its "grain" running the long way, folding it over the ends and into the air channels.

Urheberrechtlich geschütztes Material





PS PROJECTS

THIS TOOLBOX

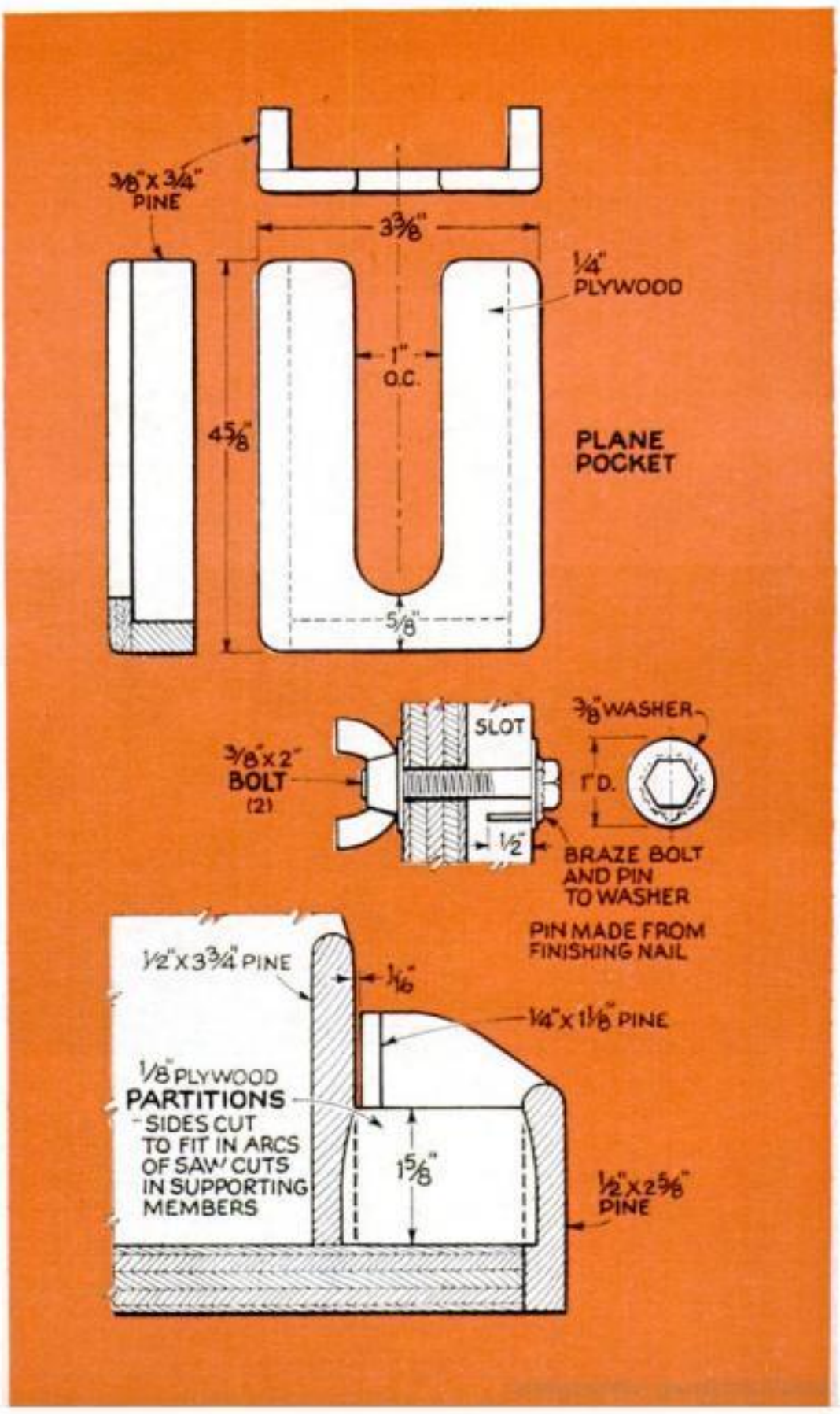
A simple construction job gives you a tote box that doubles as a portable workshop

By CHARLES E. RHINE

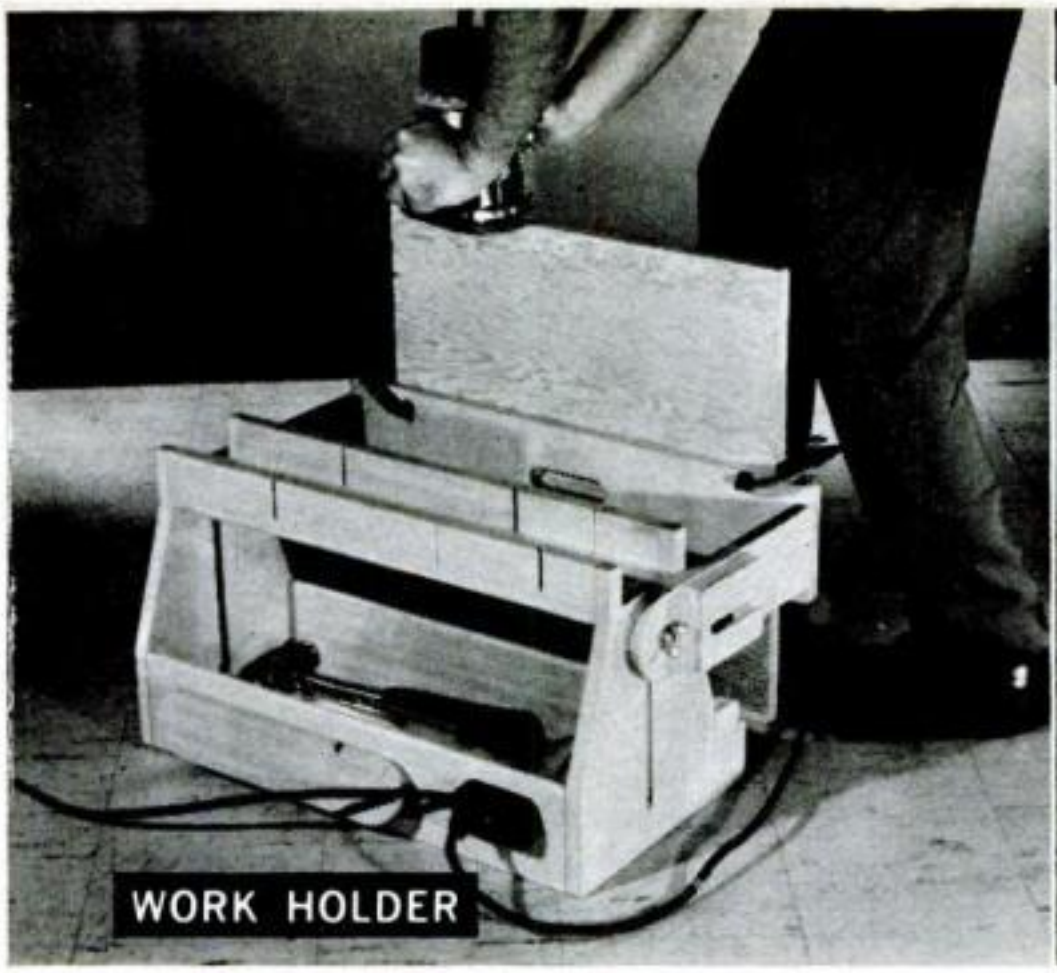
This unique toolbox has more uses than any I've seen. It's really a portable workshop that you take to the job—attic, basement, or wherever there's a chore to be done. Chances are, you'll do the job better, quicker, and easier.

As a tote box, it has room to hold all the tools and supplies you'll need for most jobs. And there are special holders for them. You don't have to throw sharp tools—chisels, planes, drill bits—in with hammer and wrenches where they will get nicked and dulled. The chisels and bits are kept in a removable tool tray that fits into the miter box. Boxes at each end of the tray hold them in place so they won't cut your fingers while you're carrying the tool case.

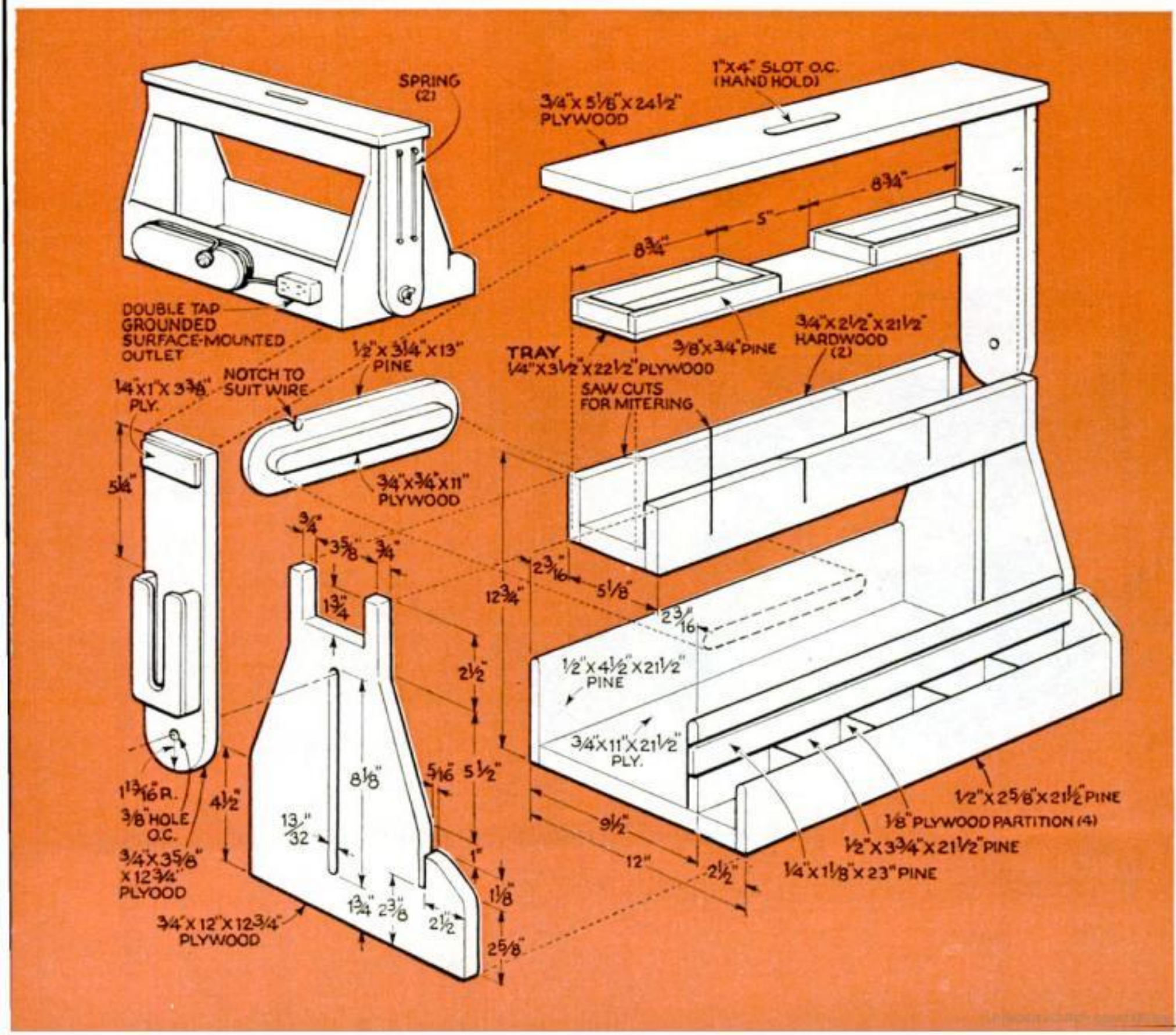
The plane fits into a holster built on one end. A wood shim keeps the blade from touching anything. At the opposite end,



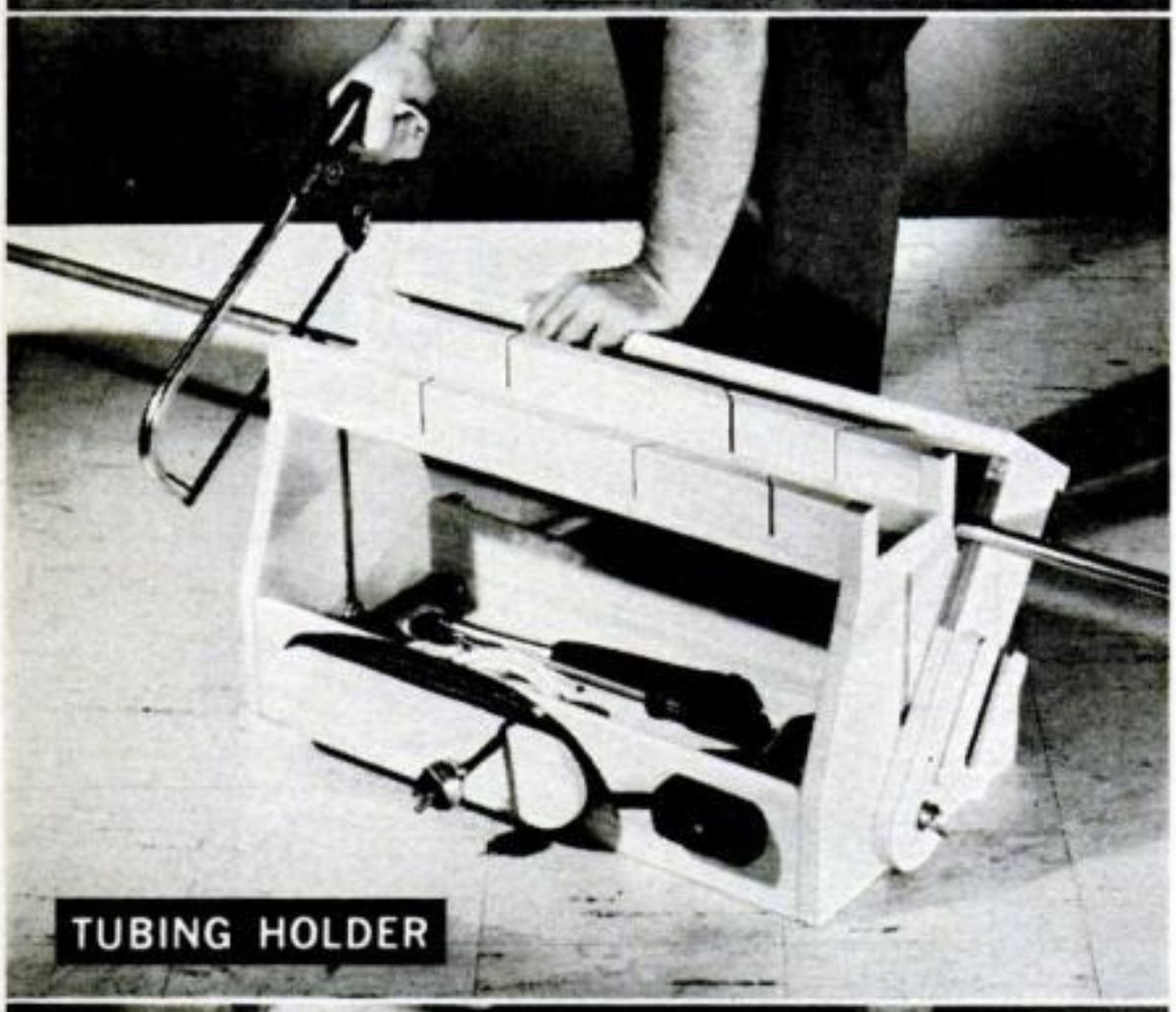
 Continued



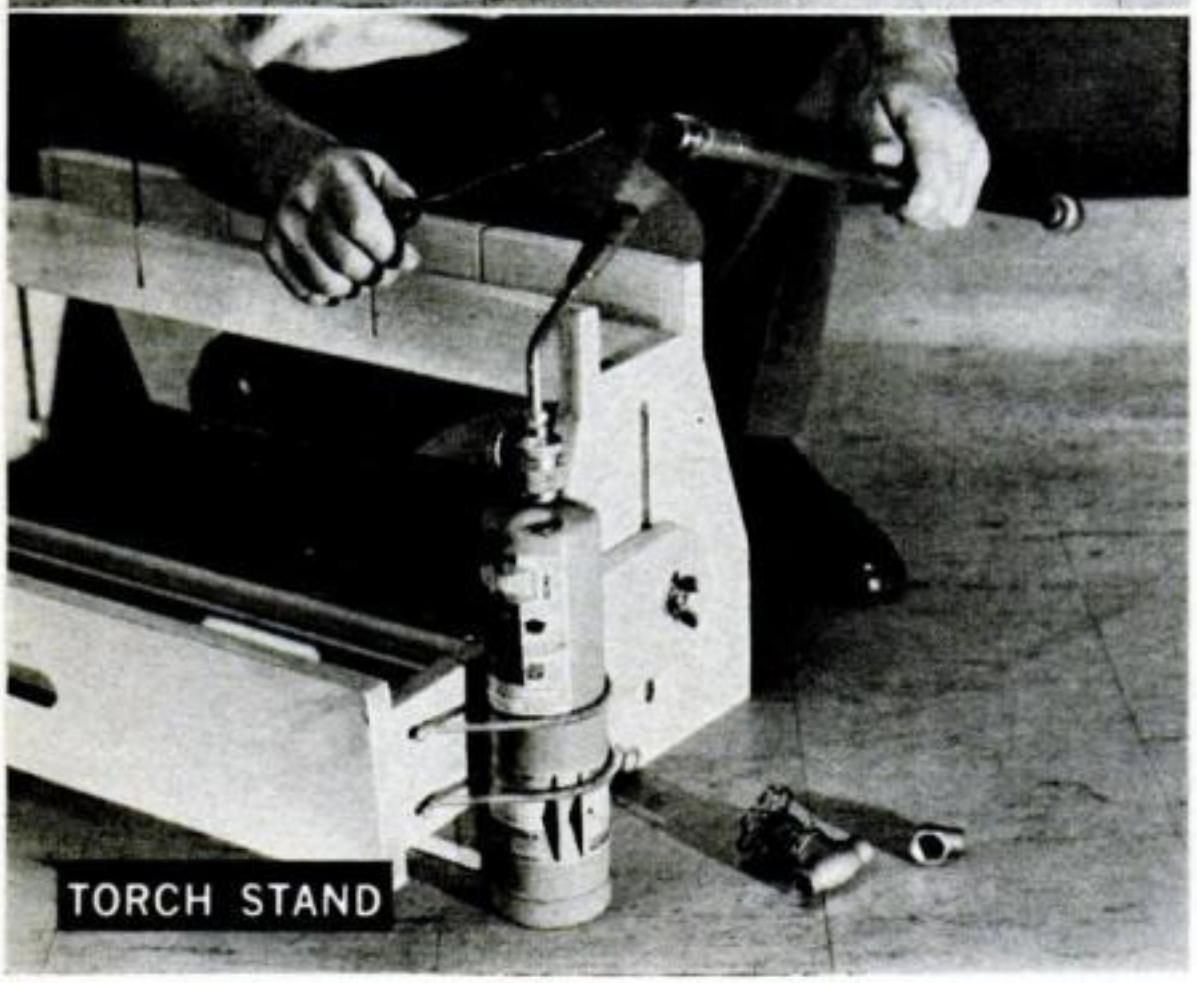
HELPS DO THE WORK



STEP STOOL



TUBING HOLDER



TORCH STAND

two springs support a propane torch so that there's little danger of it tipping over. The handsaw slides neatly into a slot behind the small-parts bin.

The adjustable top. You get a lot of use from the top. It's big enough to serve as a small workbench. You can even attach a clamp-on vise to it. Fully raised, it's at sawhorse height. At its lowest position, it serves as a step stool.

Swing the top to one side and tighten it at its highest position, and you make a holder for plywood panels, doors, and other wide work that must be supported vertically. Just clamp the work to the top. Tilt the top to form a Vee with the side of the toolbox and you've got a handy holder for working on tubing and other round stock.

Use a duplex grounded receptacle on the extension outlet. This will let you use a power tool as well as a work light. When not in use, the extension cord is wound up on the built-in spool, its free end inserted in a slot in the edge of the spool.

The toolbox was designed in cooperation with The Stanley Works. The one shown here was made from lumber-core plywood, but fir plywood would do. The toolbox sides and the miter-box walls are solid lumber. The miter box, especially, should be made of hardwood such as maple. Cut all parts and assemble, using nails and glue.

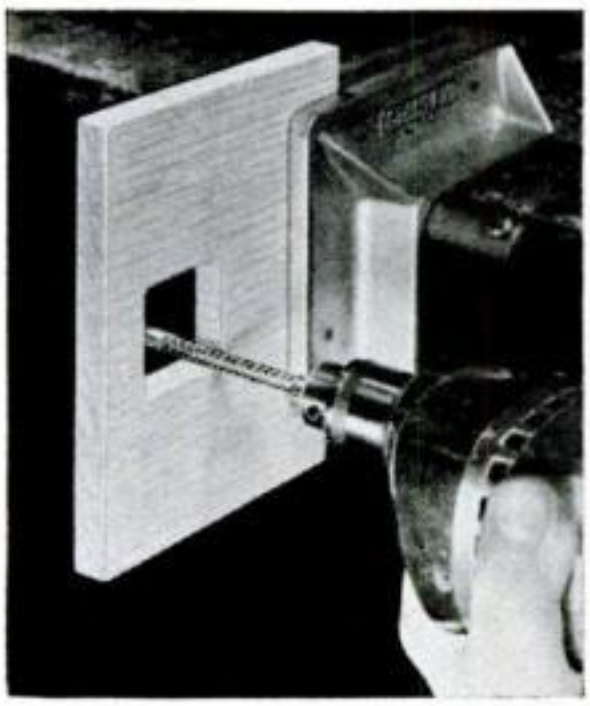
Rework the bolt heads as shown. This keeps them from turning when the wingnuts are tightened or loosened, yet the bolts can move freely up and down the slots.

Sand the box smooth, break all sharp edges, and then finish with several coats of shellac. PS

Urheberrechtlich geschütztes Material

Pencil solderer desolders

Press the plastic bulb, and solder is lifted from miniature circuit boards and mounting holes without damaging heat-sensitive components. Then re-solder with the same hollow-tipped iron—the Endeco Model 300. It's an 8"-long, 3½-ounce combination desoldering-resoldering iron that delivers 720 degrees at the tip. Its price is $13.49. Enterprise Development Corp., 1102 E. 52 St., Indianapolis, 46205, makes it.

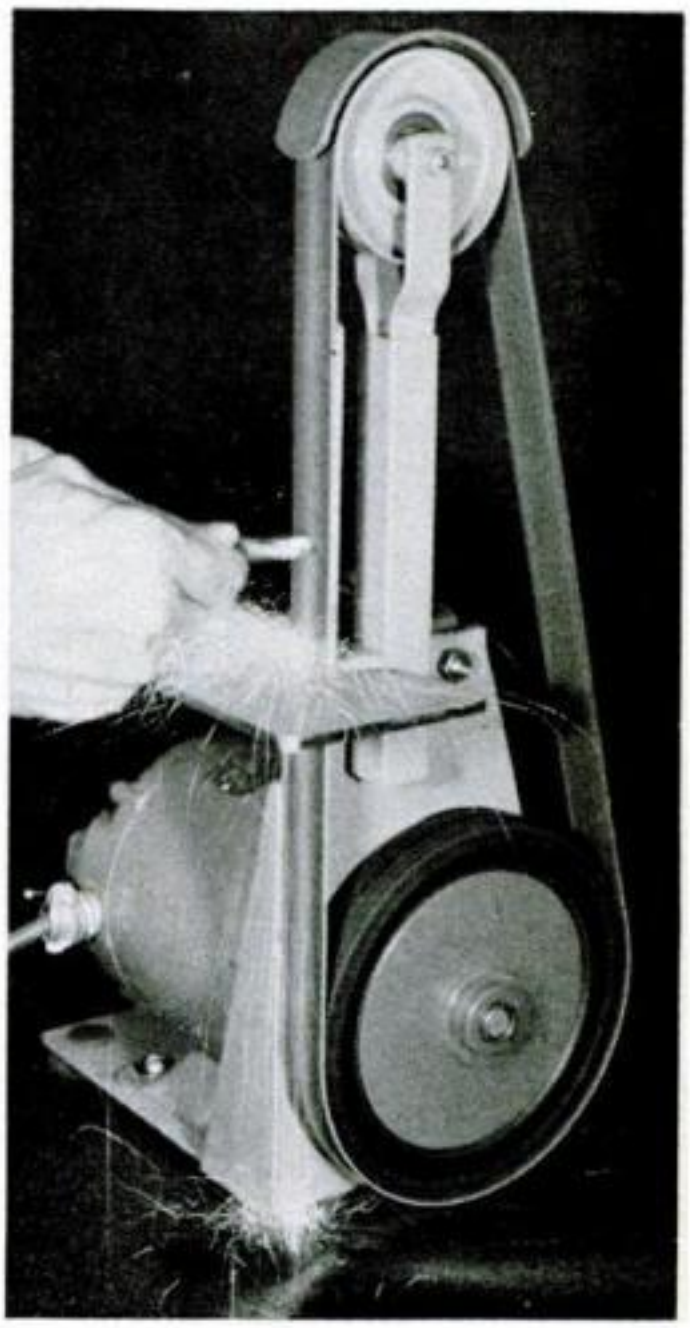


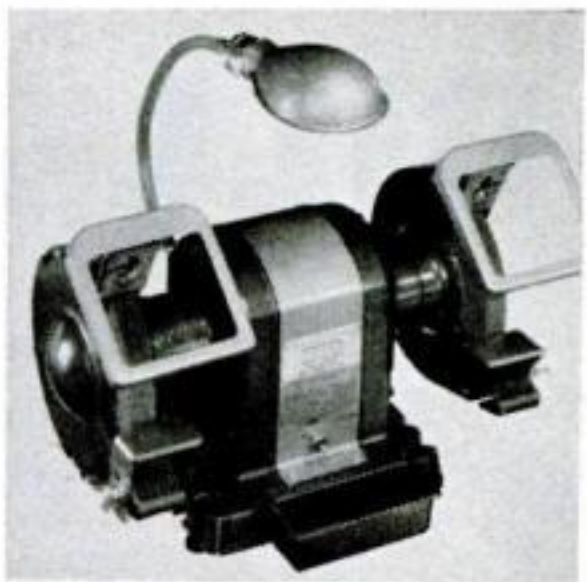
One bit does it all

Bore, saw, shape with one bit—Stanley's new drill saw for portable electric drills and drill presses. Priced at $2, it fits ¼" chucks; cuts plywood, wood, plastics, and nonferrous metals. It broadens the scope of usefulness of any power drill, and—fixed in a press—is good for simple shaping work. Stanley says it saws up to ¾" stock. Cutting surface is 3½" long.

Belt sander-grinder

This tool uses 1"-by-42" abrasive belts, needn't be bolted down, and sells for $24.95, without the ¼-hp. motor to power it. Called the Quick-Sand 165, it has suction-cup feet, carrying handle, and adjustable rest-plate for angle grinding. The motor hooks directly to the assembly's 6" drive wheel that sends the belt up onto a spring-loaded, ball-bearing idler wheel at the top. The idler wheel automatically adjusts belt tension and is capped by a belt guard. The simple, inexpensive, but capable little vertical sander-grinder is readily toted around—to the kitchen for sharpening jobs; up to the bathroom for trimming ceramic tiles; out to the garage for polishing work. It comes with one belt. You supply the motor. Arco Mfg. Co., Box 817, Grand Forks, N.D., makes and markets the unit.

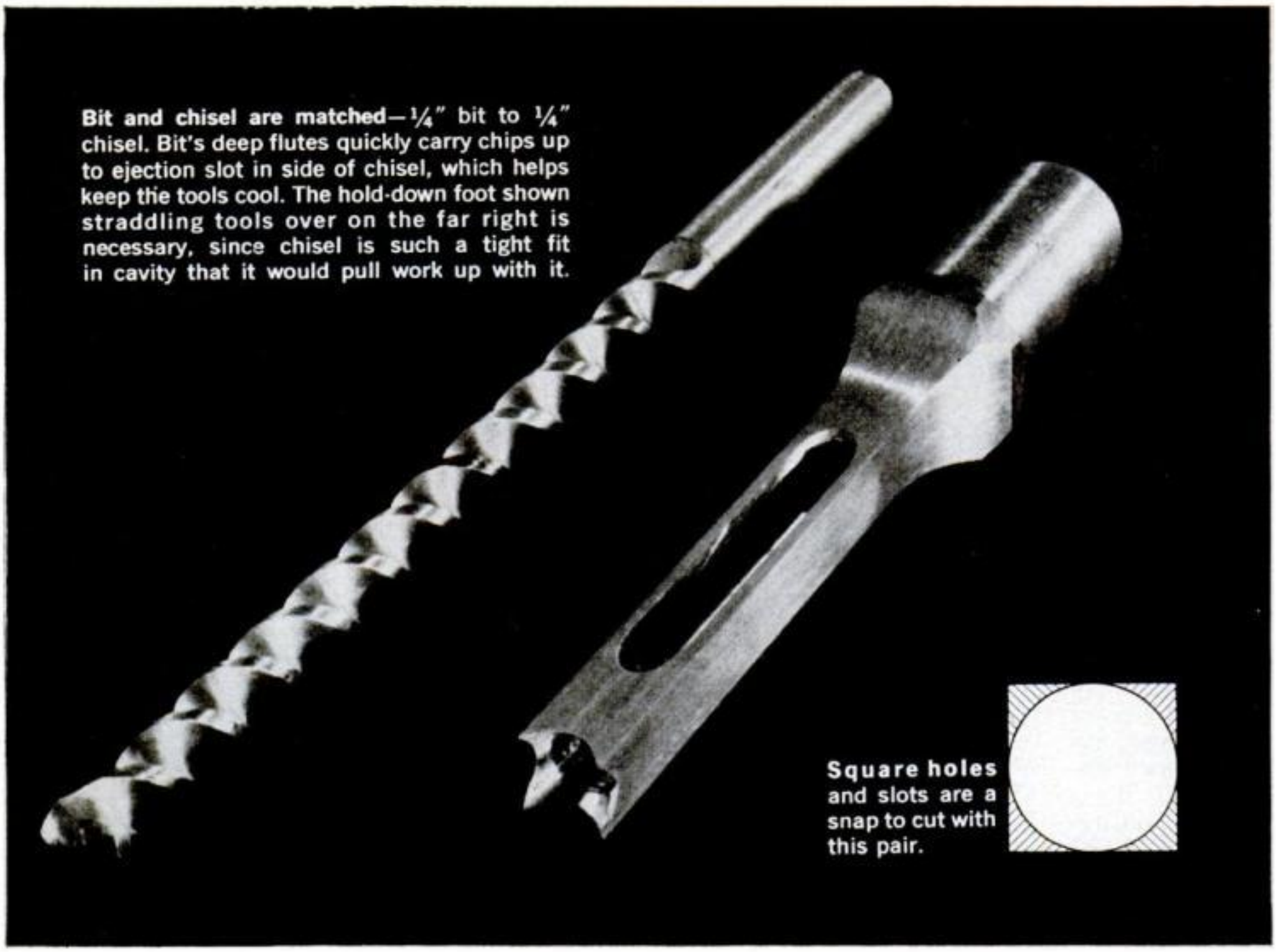




A grinder with brakes

That's Sears' new ⅓-hp. grinder. Lever to the right its three-way switch (seen below), and spinning stops within 10 seconds. A magnetic-reversal braking system does it. Grinders normally continue to spin 50 to 80 seconds after the motor is switched off. This one comes with two wheels, eye shields, water tray, tool rest, and lamp.

Urheberrechtlich geschütztes Material


Bit and chisel are matched—¼" bit to ¼" chisel. Bit's deep flutes quickly carry chips up to ejection slot in side of chisel, which helps keep the tools cool. The hold-down foot shown straddling tools over on the far right is necessary, since chisel is such a tight fit in cavity that it would pull work up with it.
Square holes and slots are a snap to cut with this pair.

The secrets of DRILL-PRESS

You can't beat mortise-and-tenon joints. And there's no easier way to cut those square holes than with mortising bits and chisels

Mortise-and-tenon combinations account for some of the strongest and most durable joints in woodworking. The closest competition is a good dowel joint. But this is true only when two dowels are used. Two are necessary to gain the anti-twist strength that a tenon in a mortise provides automatically.

The tenon is a snap of a table-saw job—formed by making passes with a regular saw blade or by working with a dado. It's the mortise, or square cavity, that tends to stop many shop workers. But if you use available drill-press accessories correctly, this, too, becomes a routine operation that pays off in first-class craftsmanship.

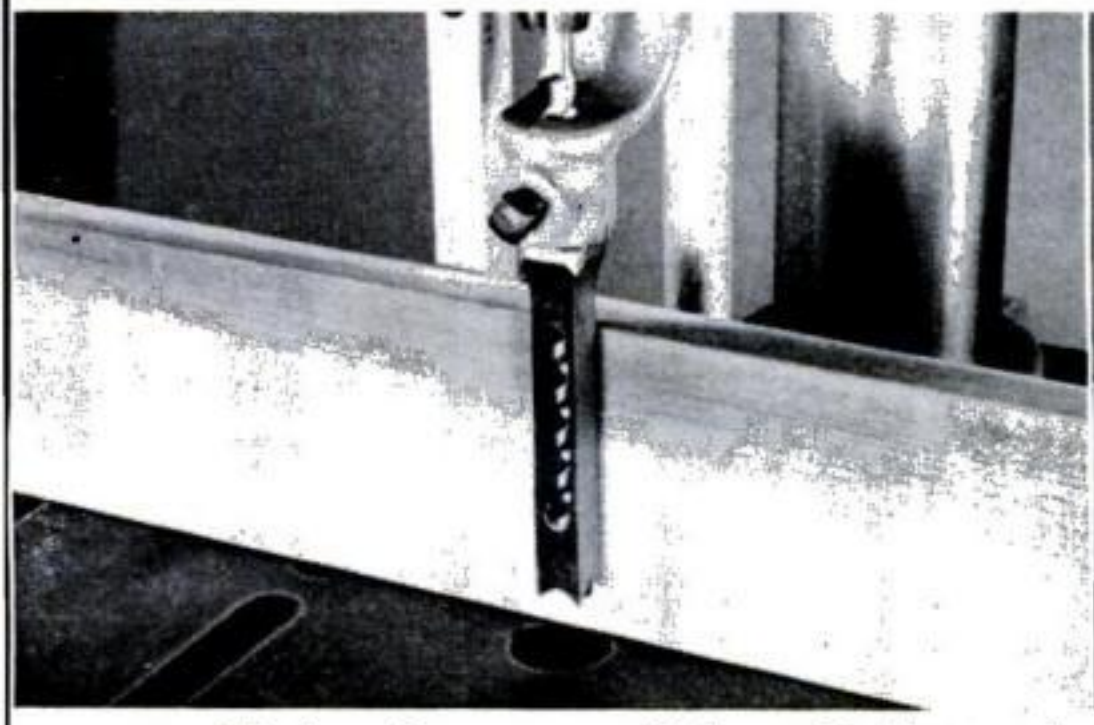
The tools. A mortising bit forms a hole much like a drill bit, but it is encased in a square steel sleeve—actually a four-sided chisel. The bit removes most of the waste stock. The chisel cleans out the corners that remain. The result is a square hole. One side of the chisel is slotted so chips formed by the bit can escape.

Continued

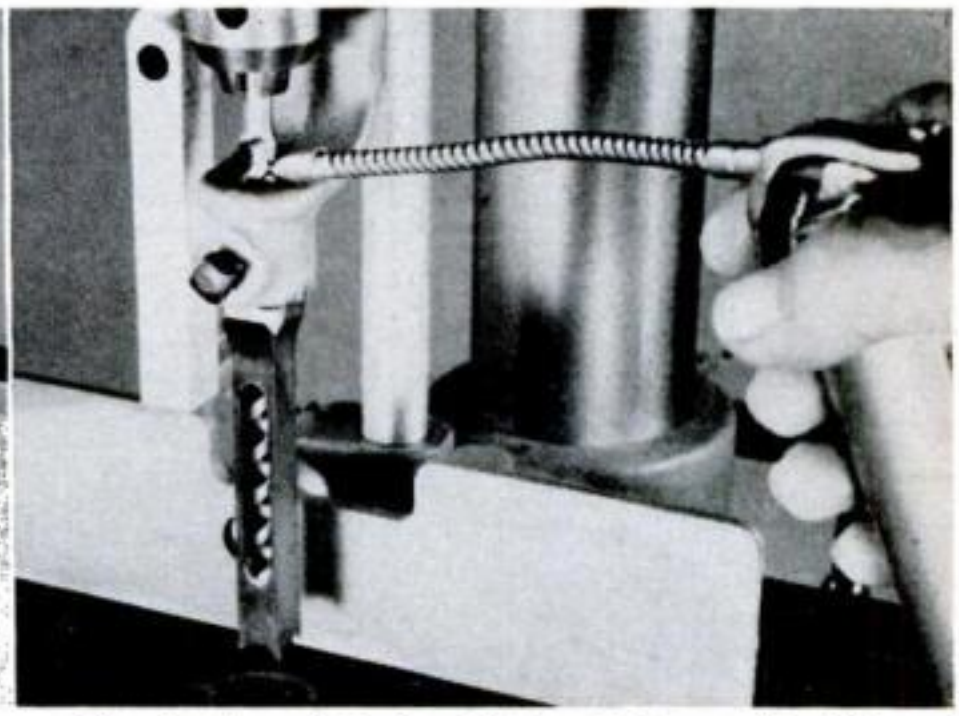
Urheberrechtlich geschütztes Material

MORTISING

By R. J. DE CRISTOFORO

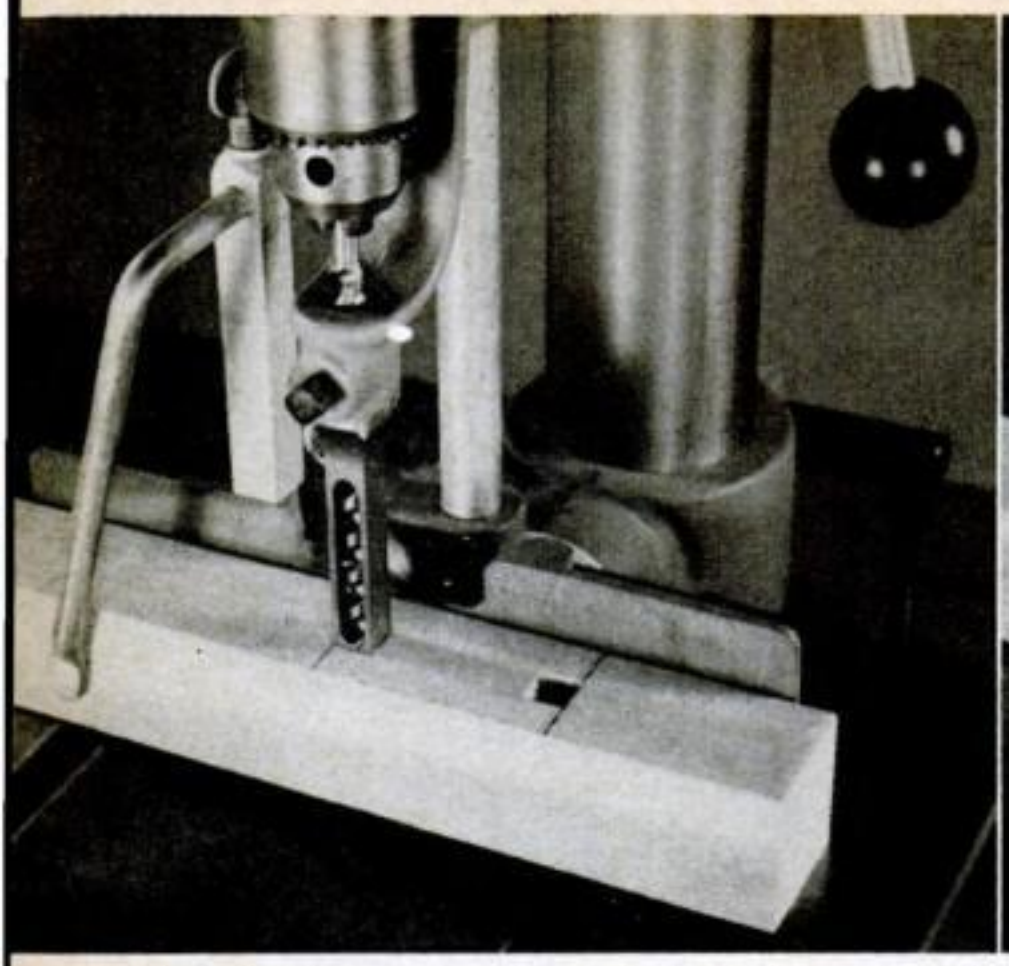


Chisel must square up with fence. Do the squaring after the fence base has been locked to the drill-press table. Use a square or, as here, a smooth board between chisel and fence. With the board as a wedge, chisel can't move as you tighten setscrew.

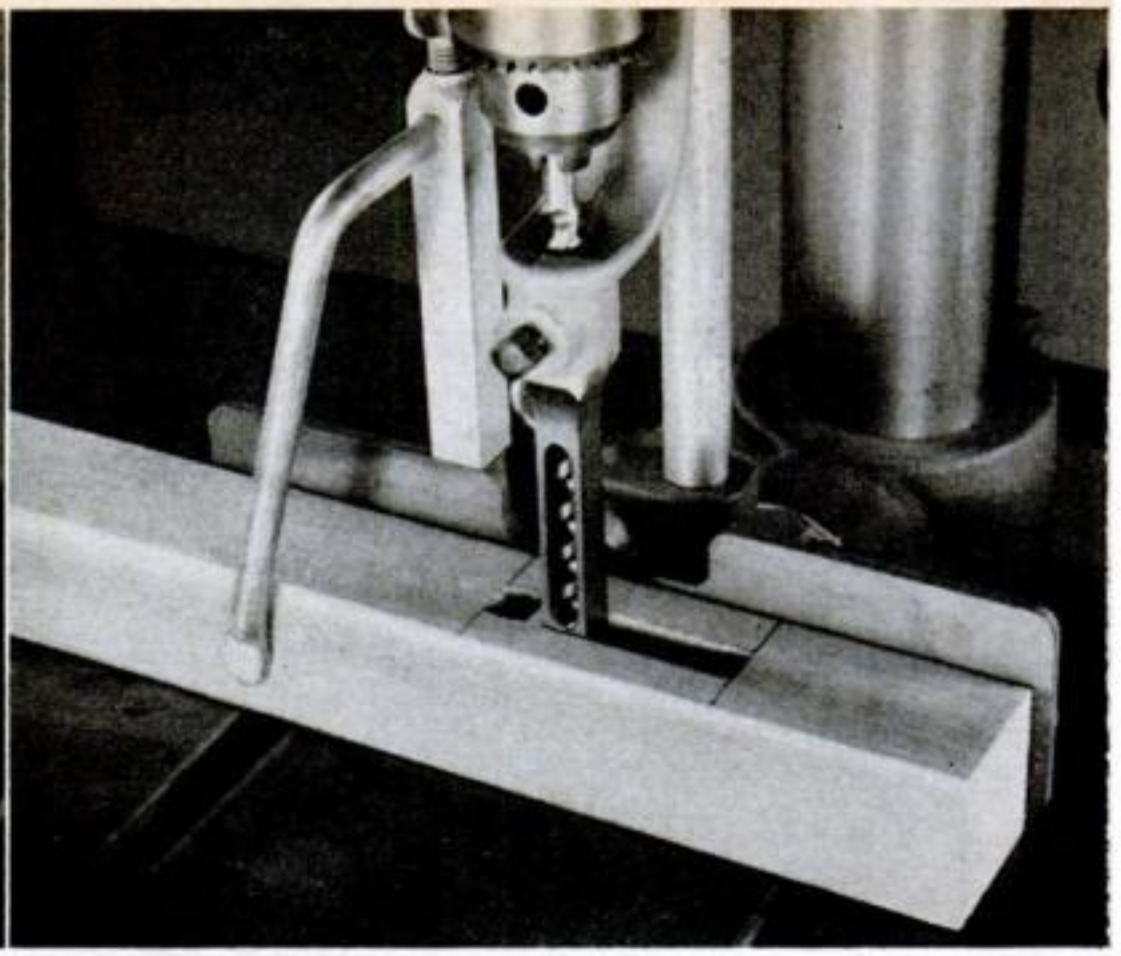


There's bound to be friction between the bit and chisel, so a touch of oil at the top of the chisel is in order. However, it is possible to over-oil. A drop or two at the start of a job is plenty and should be all that's necessary to see you through.

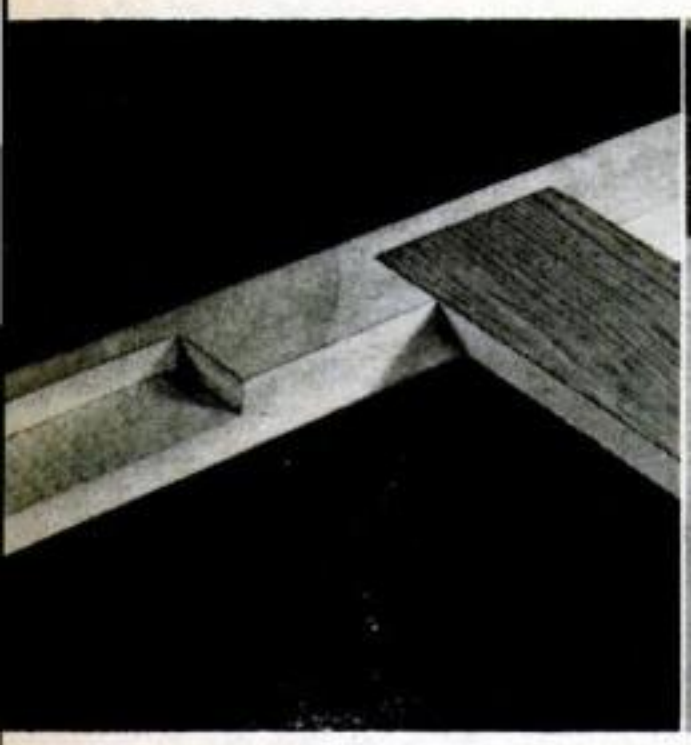
Urheberrechtlich geschütztes Material



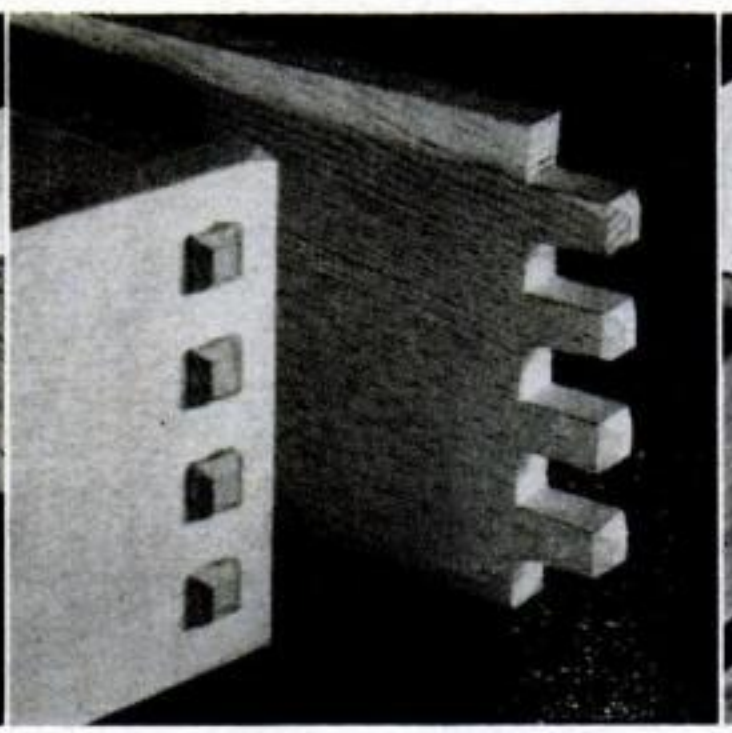
Chisel tends to creep toward already-formed cavities. For that reason it's best to make your first cuts at the ends of a slot before tackling the material in between. For sake of clarity, the hold-down feet were removed from work here and at right.



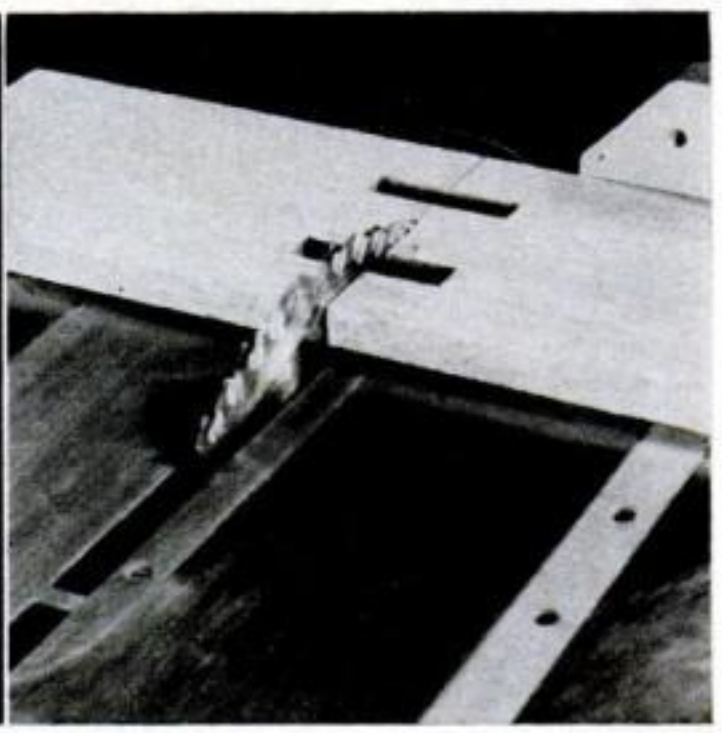
To remove stock between ends of a slot, make successive, overlapping cuts. Ideally, these should be about three-quarters of full chisel width. But that isn't always possible, especially on the very last cut. Nevertheless, stay as close to it as you can.



Side mortises have it over dadoes for middle frames and intermediate crosspieces. The hidden ends result in a more refined-looking product. Yet side mortises made on a drill press take no more time than the less-attractive dadoes.



Multi-tenon joints are strong. And as exemplified here, they can be attractive, too. With one exception (next picture), your mortising bit and chisel make both parts of such joints—the slots that the tenons go into, and the tenons themselves.



Tenons, two-sets-at-a-time, call for mortises twice as long as the length of one tenon, plus the kerf width of a table-saw blade. Do the slotting, then cut apart on the saw. Number of tenons, width, and spacing vary with strength requirements.

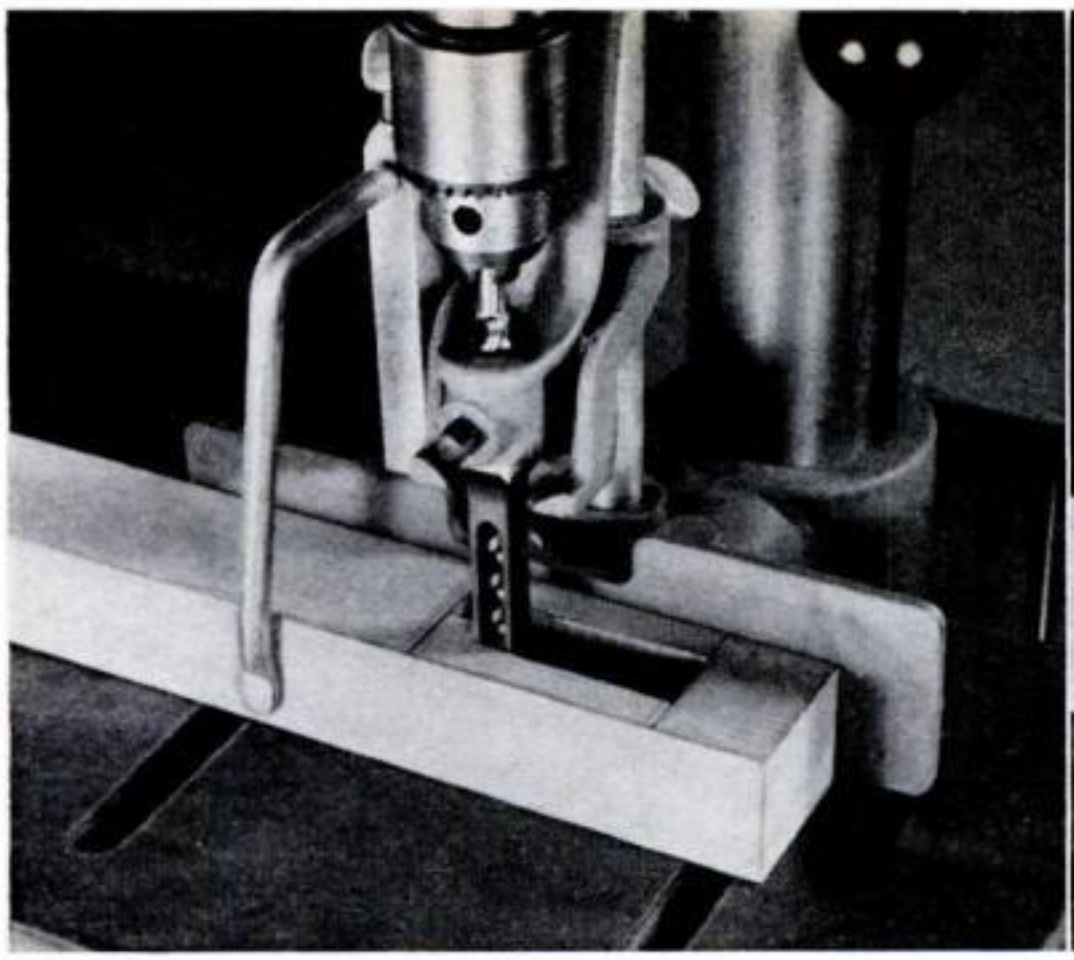
The bit is gripped by the conventional drill-press chuck, but the chisel is secured by a special casting that generally locks on the end of the quill. Mortising accessories are usually sold in kits that include the casting hold-downs and a fence. Methods of setting up are similar, but there could be differences, depending on your drill press.

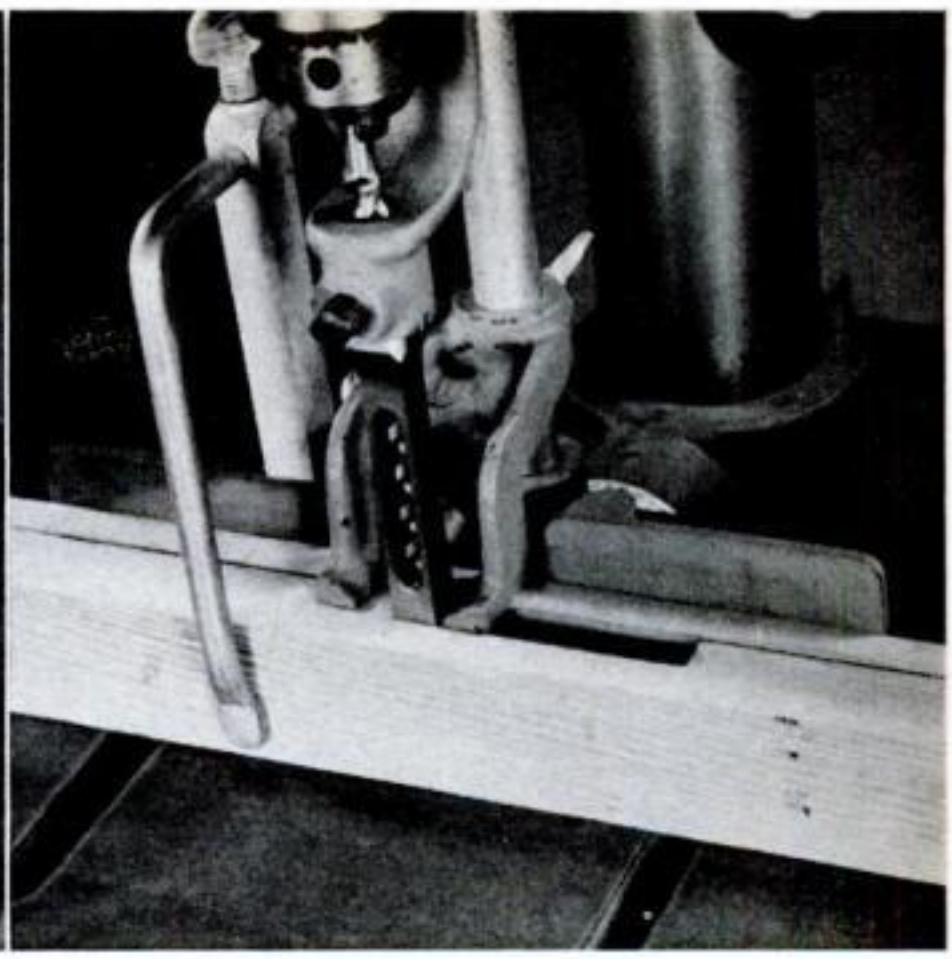
In all cases, two factors are quite important. The chisel must be square to the fence so cutting will be done parallel to the edge of the work. There must be at least $\frac{1}{32}$", but not more than $\frac{1}{16}$", clearance between the spurs on the bit and the cutting edge of the chisel.

Keeping this clearance to a minimum is a good idea, but don't play it so tight that you create excessive friction between bit and chisel. This would result in overheating and could harm the tools. Too much clearance would cause the bit to form large chips, which might not pass through the escape slot in the chisel.

Using the tools. Generally speaking, the

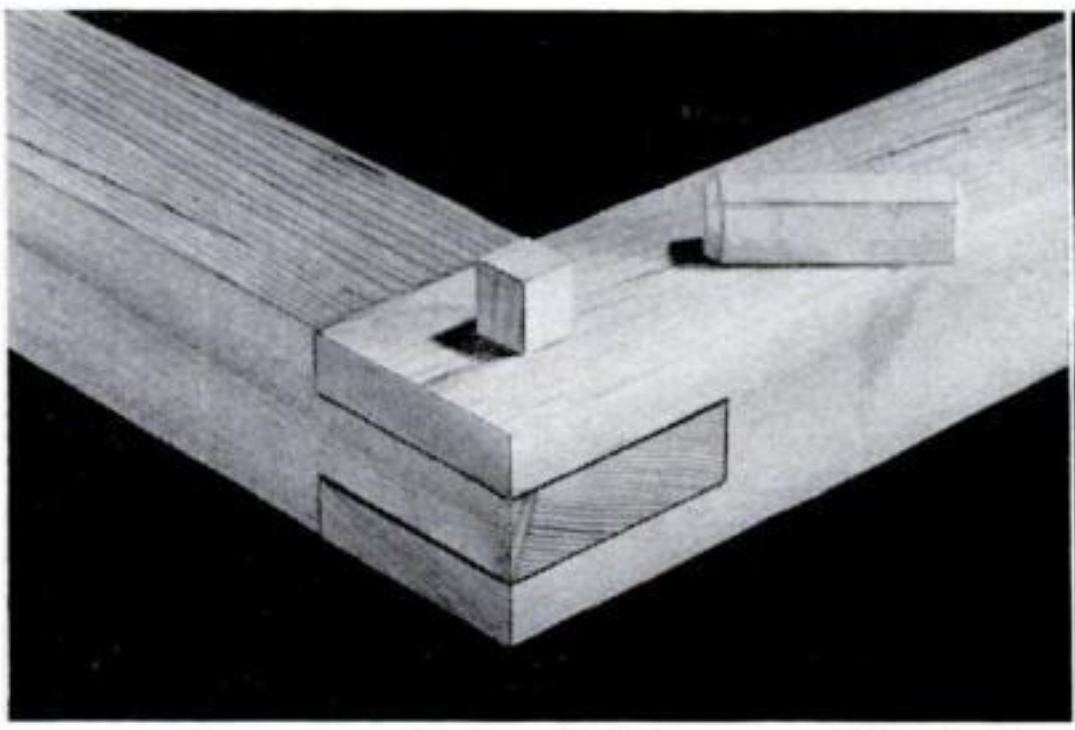
Urheberrechtlich geschütztes Material

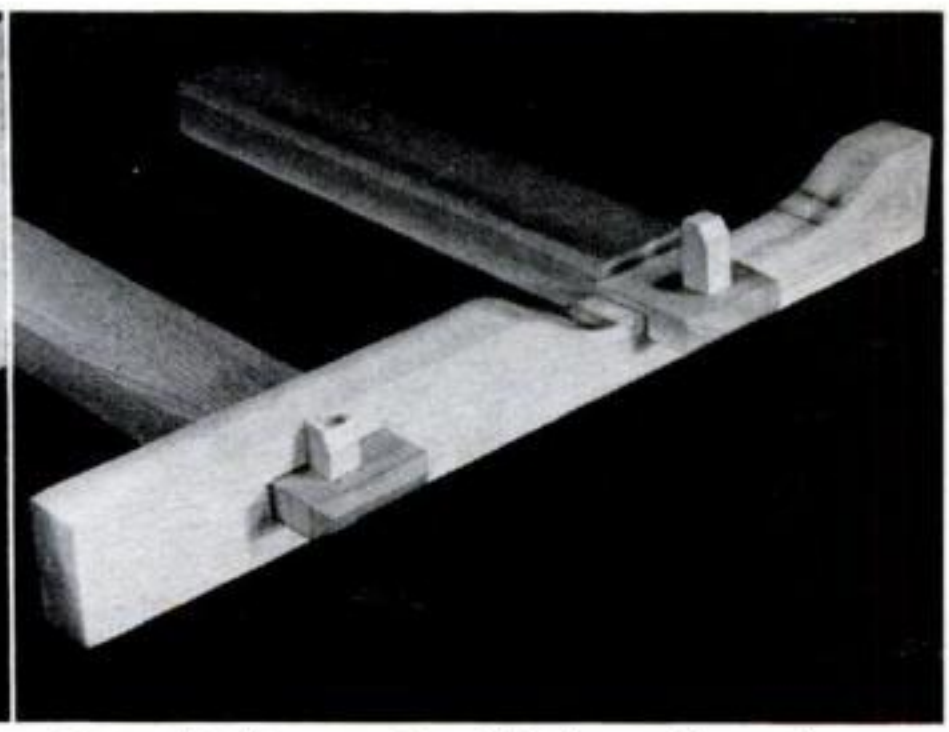




Don't leave narrow shoulders when forming mortises wider than the largest chisel you own. Instead, work with a smaller chisel. Making those three-quarter-width cuts will be easier. If mortise is centered, cut top, then turn work end-for-end and cut bottom.

In forming side mortises, place a strip of scrap stock between the work and the fence and proceed as already outlined. If the side mortise is shallower than your smallest chisel, make the setup so that the surplus bite comes out of the back-up block.





Square pegs lock end joints more efficiently than dowels. The square peg is stronger and withstands stresses that cause swiveling in a doweled joint. The only difference: You mortise instead of drilling. The extra peg shows how peg ends can be chamfered so that when allowed to project they become an attractive and complementary design detail.

For a Mexican or Spanish flavor—becoming more and more popular in furniture—use this type of mortise-tenon joinery. When the distance from tenon shoulder to the inner edge of the square hole is a hair less than the thickness of the stock through which the tenon passes, pieces can be pulled up tightly enough to hold permanently without glue.

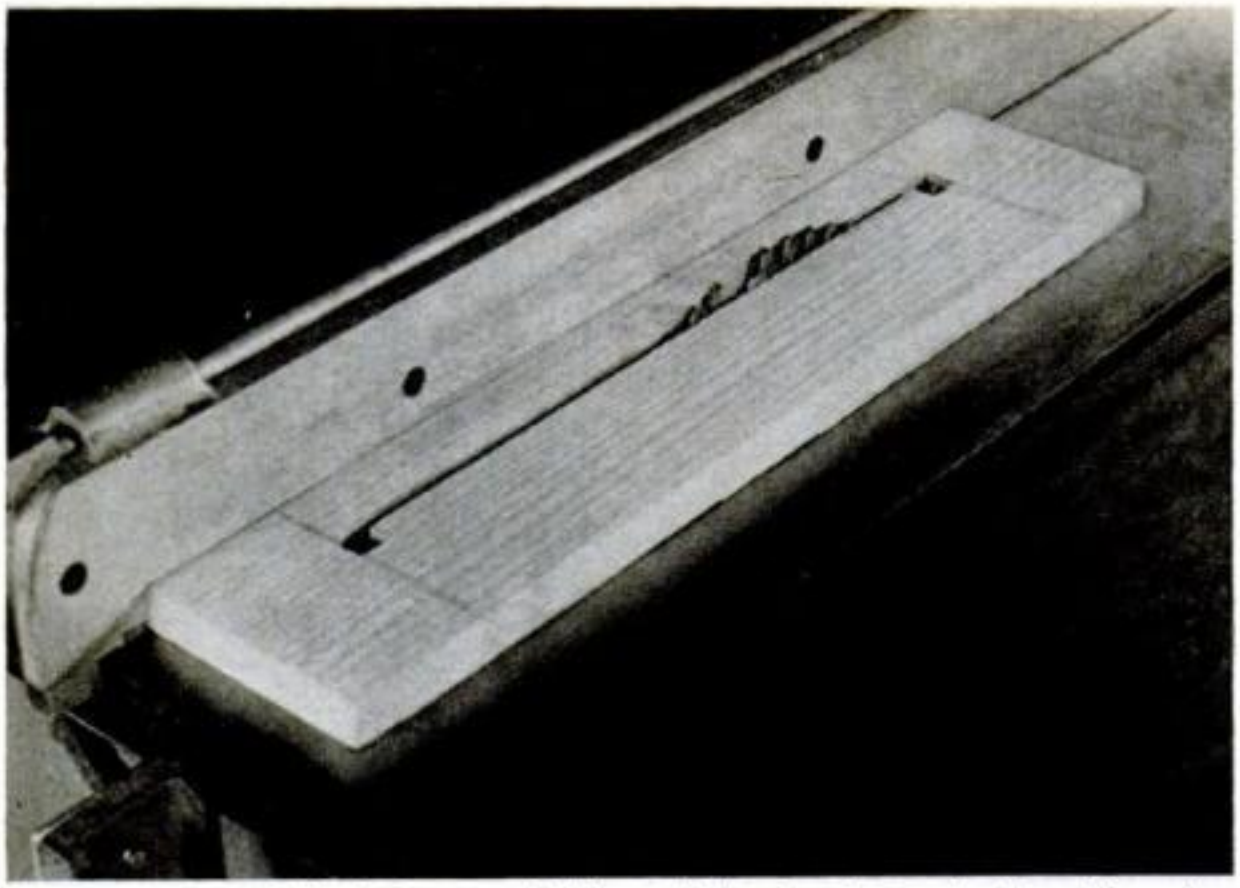
larger the chisel, the slower the speed, especially in hardwoods. For chisels up to ½" size, use a speed range of 1,700 r.p.m. to 3,500 r.p.m. in softwoods; a maximum of about 2,000 r.p.m. in hardwoods. Like so many rules, these apply best under ideal conditions. There are differences in softwoods and in hardwoods, even in boards cut from the same tree. You must also consider whether you are cutting across the grain, through the grain, or perhaps with it down into end grain.

So accept the rules as generalizations and break them according to how the cut is going. Excessive feed pressure should never be necessary. On the other hand, a feather touch will not do the job, since the chisel cuts under quill-feed pressure only. Be sure the waste chips move smoothly up the flutes of the bit and easily out through the escape slot. Retracting may help.

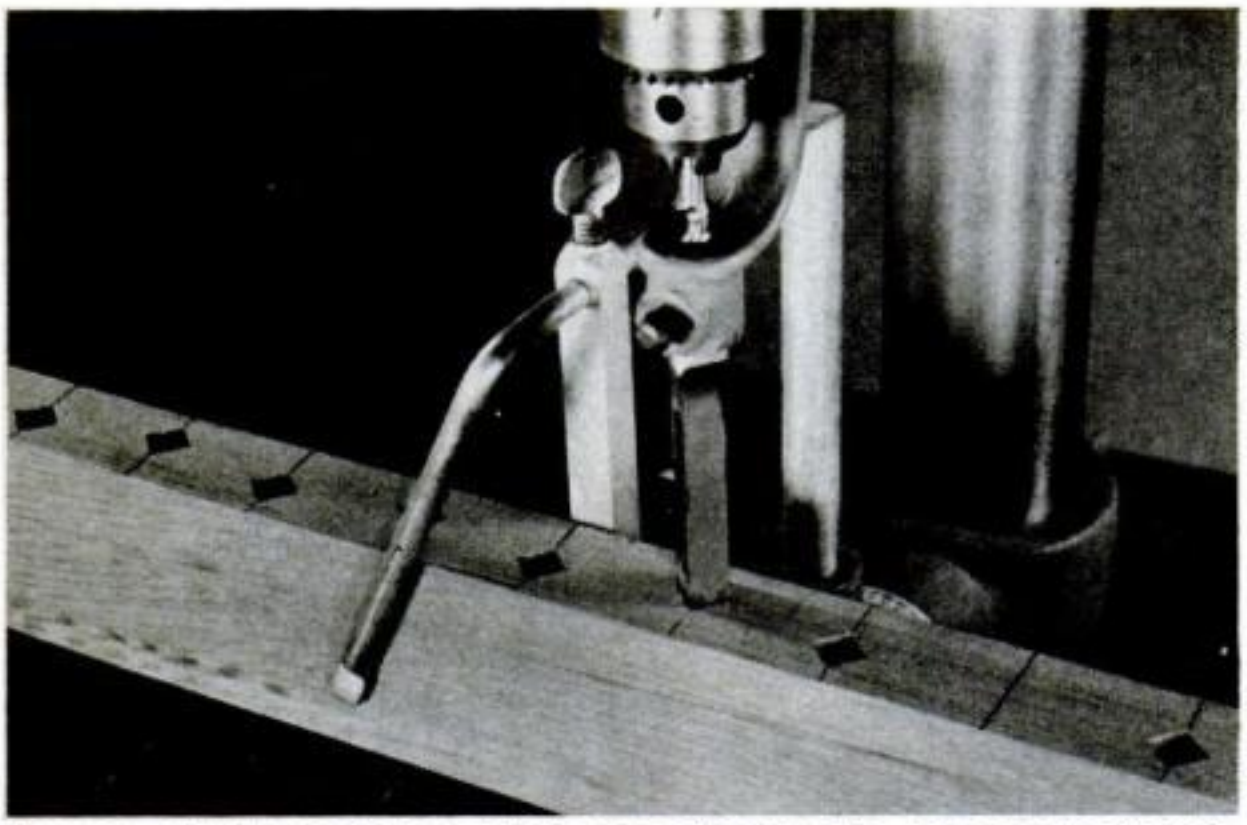
The depth of blind mortises is controlled by using the quill-feed stop rod as for

Continued

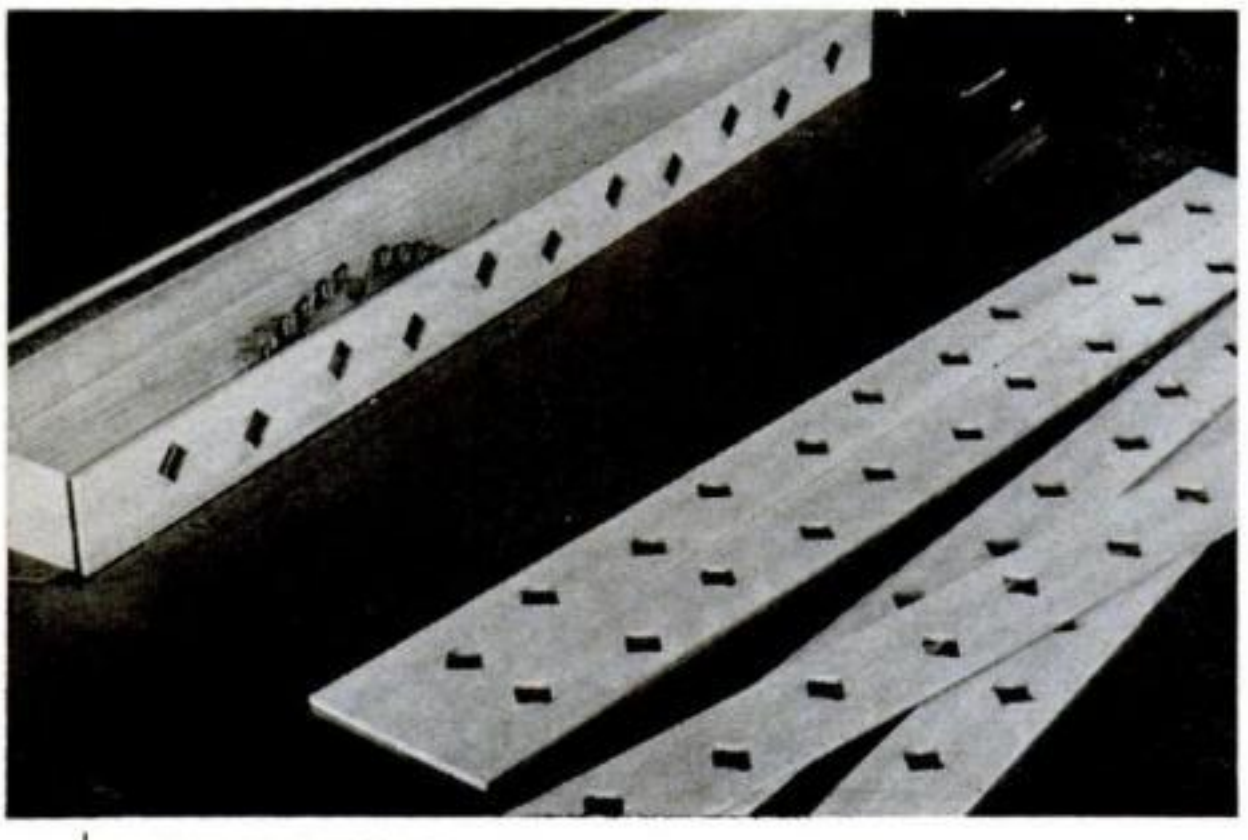
Urheberrechtlich geschütztes Material



Long, square-ended slots are quickly made by forming only the slot ends with mortising bit and chisel, doing the rest on a table saw. Two saw cuts do it. With a table saw as a companion tool, many decorative cutting ideas—for panels, folding screens, and such—suggest themselves.



You can cut diamond-shaped holes by adjusting the chisel a quarter of a turn. Although not visible, the fence is behind the work as usual. What good is this piece? See below how the thin strips make a panel.



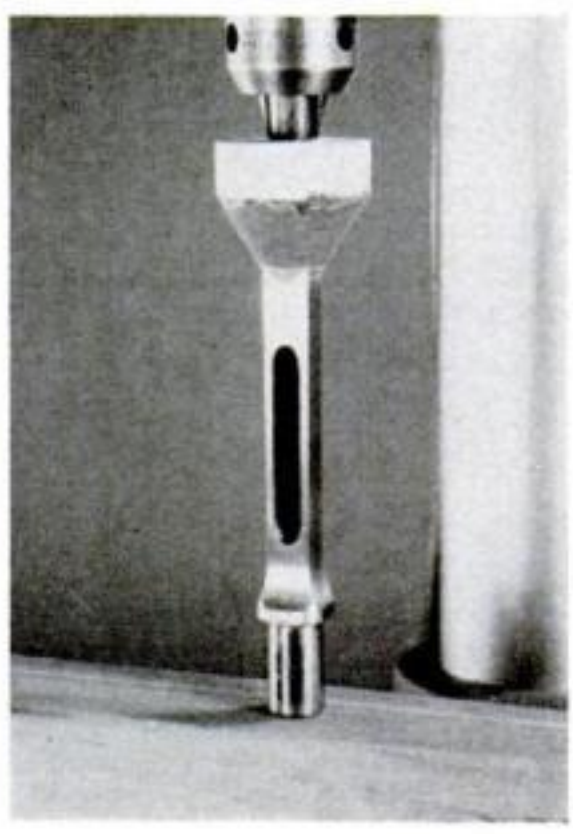
ordinary drilling. Use scrap stock under the work to protect the tools.

There is bound to be some splintering where the chisel breaks through. This is minimized by the scrap block under the work. But, for a perfect job, work on stock that is slightly thicker than the part needed. Then, after the mortise is formed, a slight shaving cut on the table saw will remove the imperfections.

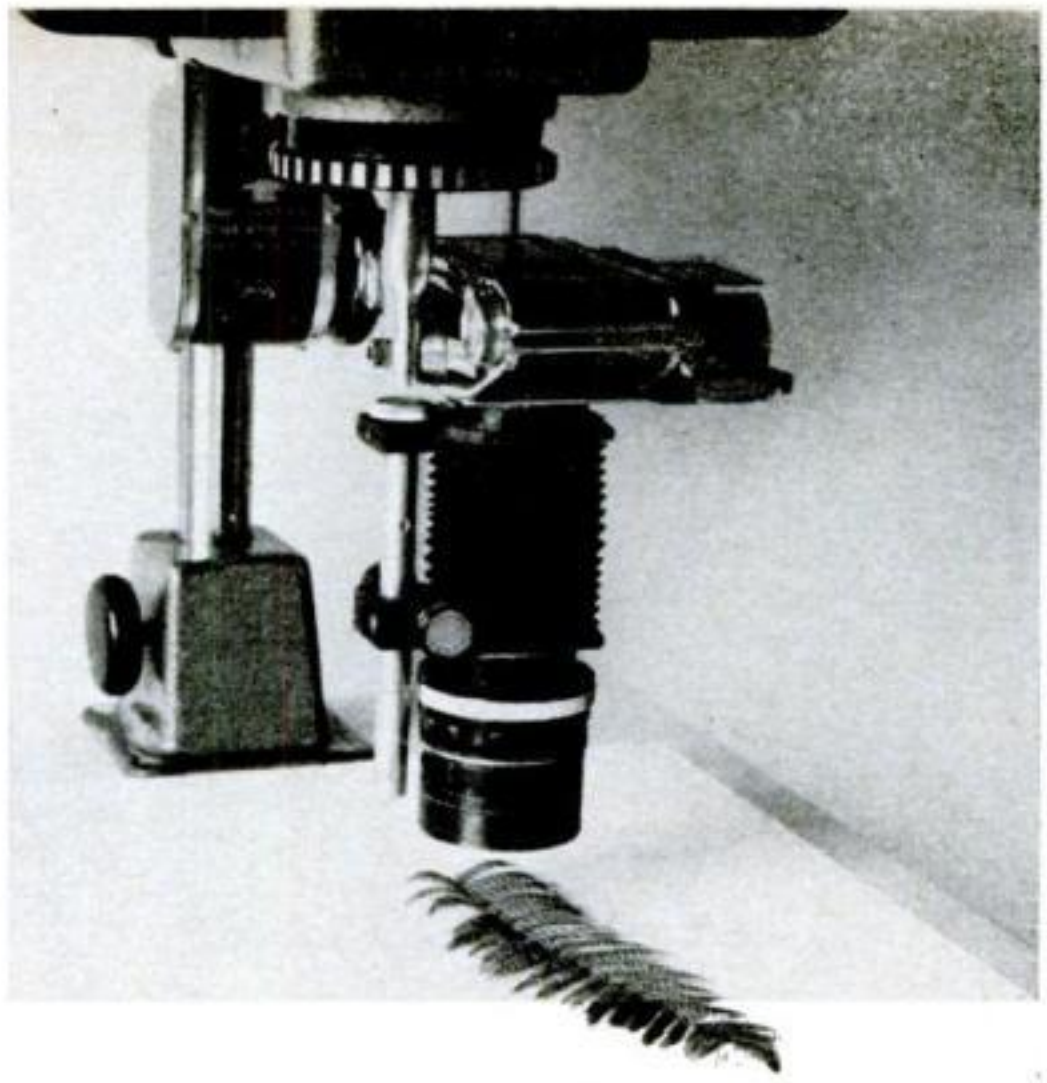
The tenon, which is a table-saw job, should not be so tight that it must be forced, or so deep that it fills the mortise. As in a dowel joint, there must be room for excess glue. So cut the tenon about 1/16" shorter than the depth of the mortise, or chamfer the ends of the tenon.

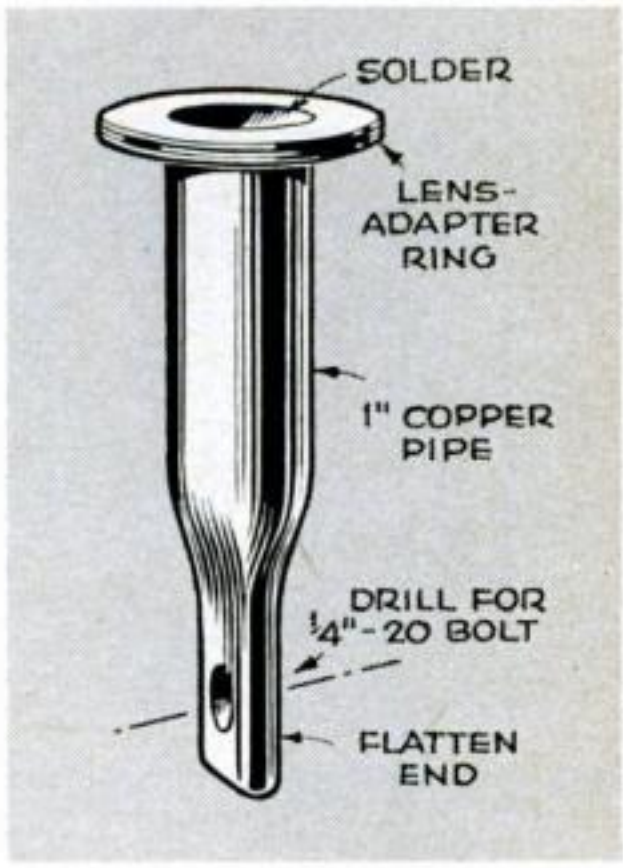
What does it cost to get into drill-press mortising? A basic outfit—bit, chisel, chisel-housing, fence, and hold-down—runs from $15 to $20. PS

Chisel must be sharp, because feed pressure of the quill is the only push behind it. An emery wheel, pictured in chuck below, is the best sharpening tool. Make one by lathe-shaping a cone to match the chisel bevel. Coat with cement; apply emery.



Urheberrechtlich geschütztes Material





Enlarger shoots professional close-ups

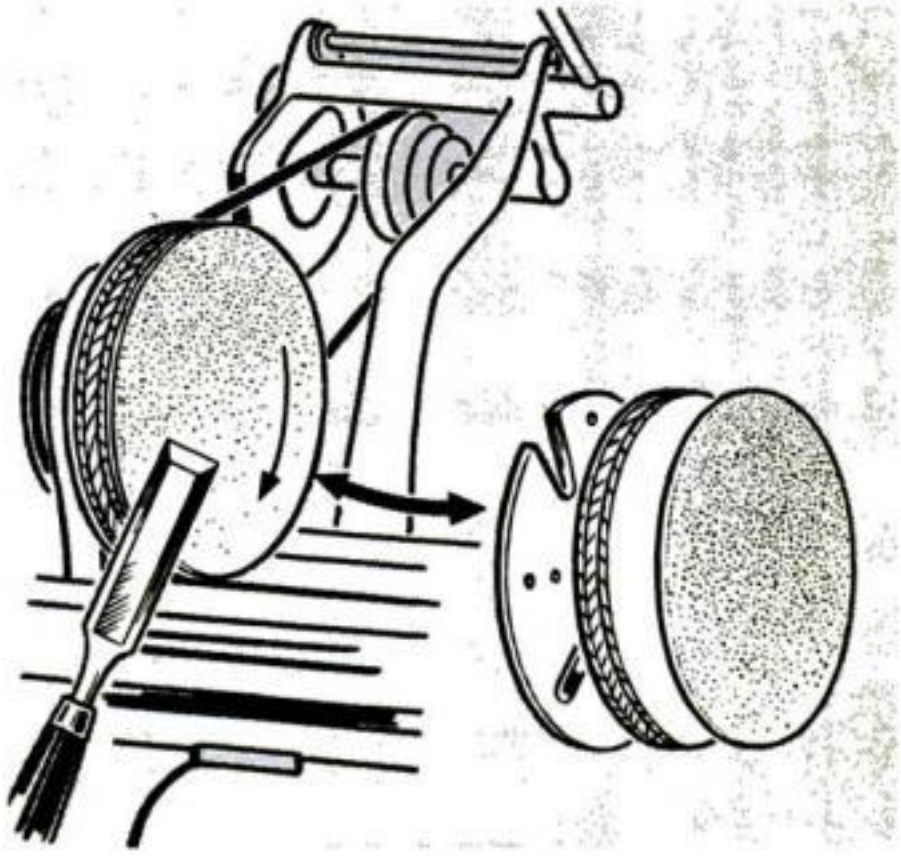
Close-ups are complicated by composing, focusing, lighting, and camera-shake problems. Lick them all by shooting with a camera mounted on your enlarger. Make a camera support from a 6" length of 1" copper pipe soldered to the threaded part of an enlarger lens adapter. Flatten the other end in a vise and drill it for a ¼"-20 bolt to fit the camera tripod mount. Screw the support into the enlarger; position camera with the enlarger controls and you're all set to snap perfect photos of objects close up.

C. Skladal, Sunnyvale, Calif.

Key extension avoids scratched fingers

A straight-handled water faucet makes a good extension for your electric-drill chuck key so sanding disks, wire brushes, and grinding wheels can be attached easily. Adapt your key by driving out the crossbar and fitting the faucet handle (after drilling it out to fit over the key shank). Pin the handle to the key or use a cotter pin to hold it securely in place.

T. H. Bell, N. Attleboro, Mass.



How to machine-hone cutting edges

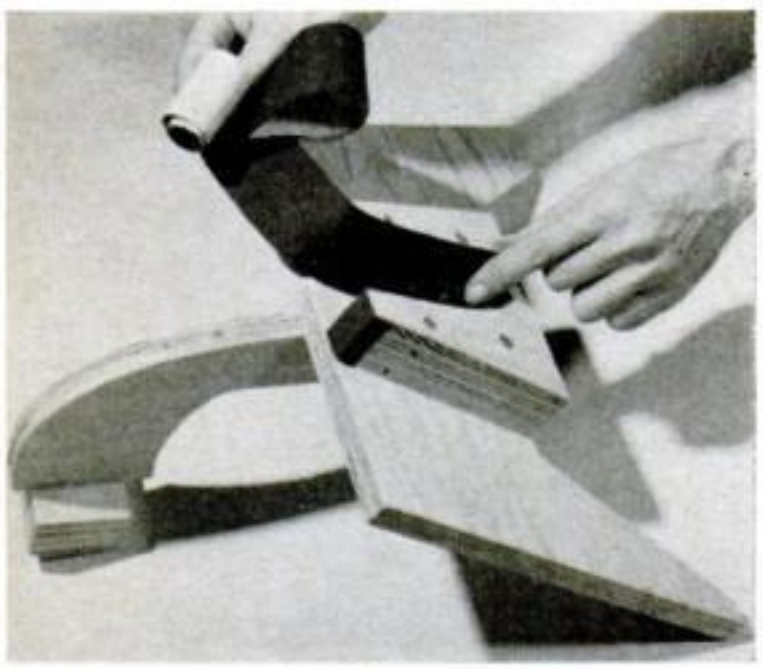
Put a razor edge on your woodworking tools by honing them on a lathe after stoning. Glue a disk cut from shoe leather or wide belting to plywood backing. Fasten to a faceplate or hold in a chuck. Oil the leather; run the lathe at lowest speed. Use back gears for delicate tools. Hold the tool you are sharpening so that the disk will rotate away from the cutting edge.

Peter Legon, Malden, Mass.

Urheberrechtlich geschütztes Material

TO TRANSPORT YOUR RIFLE SAFELY, BUILD THIS—

Gun Rest for Your Car

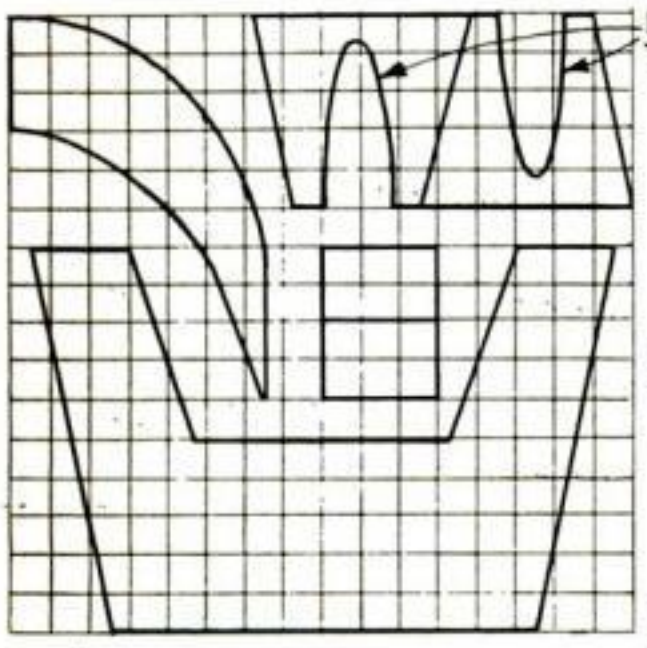


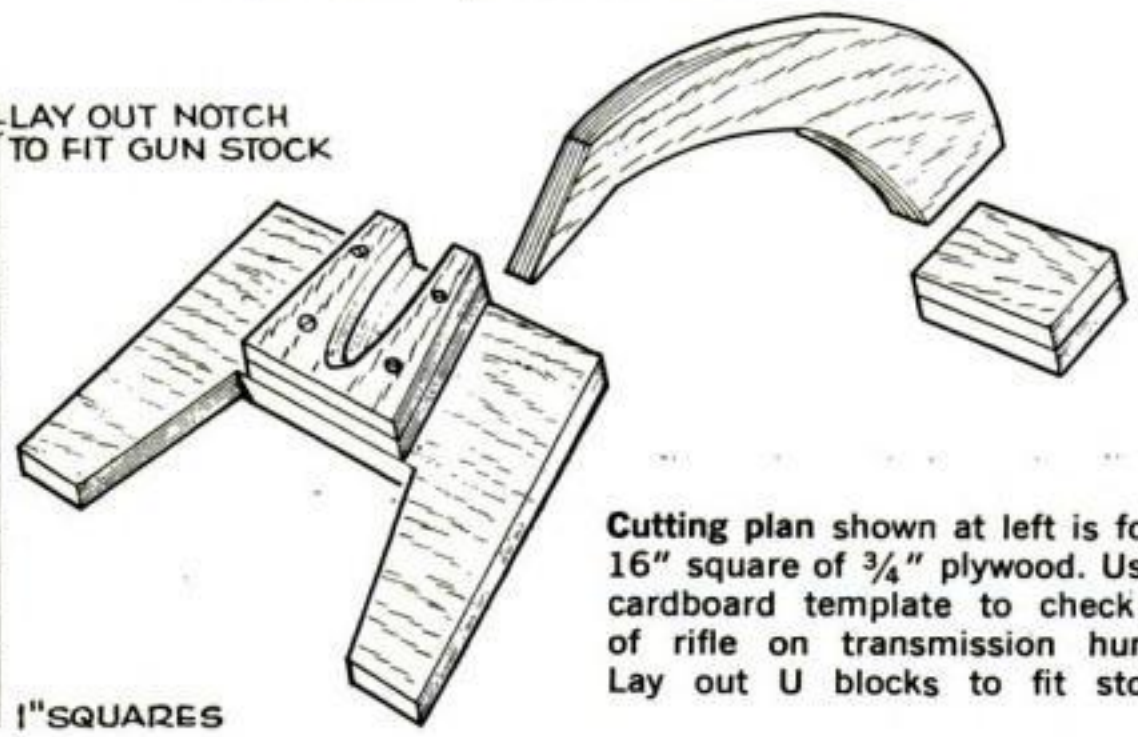
Assemble the parts with glue and wood screws. Glue a strip of felt or wool cloth around the inside edges of the butt rest to prevent marring of the rifle stock.

Carry your rifle to and from the hunting camp or shooting range with this homemade car rest and you can quit worrying about knocking your scope out of alignment during a sharp turn, hard bump, or quick stop. Straddling the transmission hump, it holds an unloaded gun steady, yet in quick grabbing distance in case you spot a legal target.

You can build this gun rest entirely from a 16″-square piece of ¾″ plywood. Just jigsaw the parts as shown in the cutting plan. Slight alterations may be necessary to custom-fit some makes of cars. Assemble with glue and wood screws; then line the butt rest with felt or wool to prevent marring the rifle stock.

Increase the base width and add two U blocks, so your buddy can rest his rifle, too.





Cutting plan shown at left is for a 16″ square of ¾″ plywood. Use a cardboard template to check fit of rifle on transmission hump. Lay out U blocks to fit stock.

Urheberrechtlich geschütztes Material

FOR YOUR YULETIDE LAWN

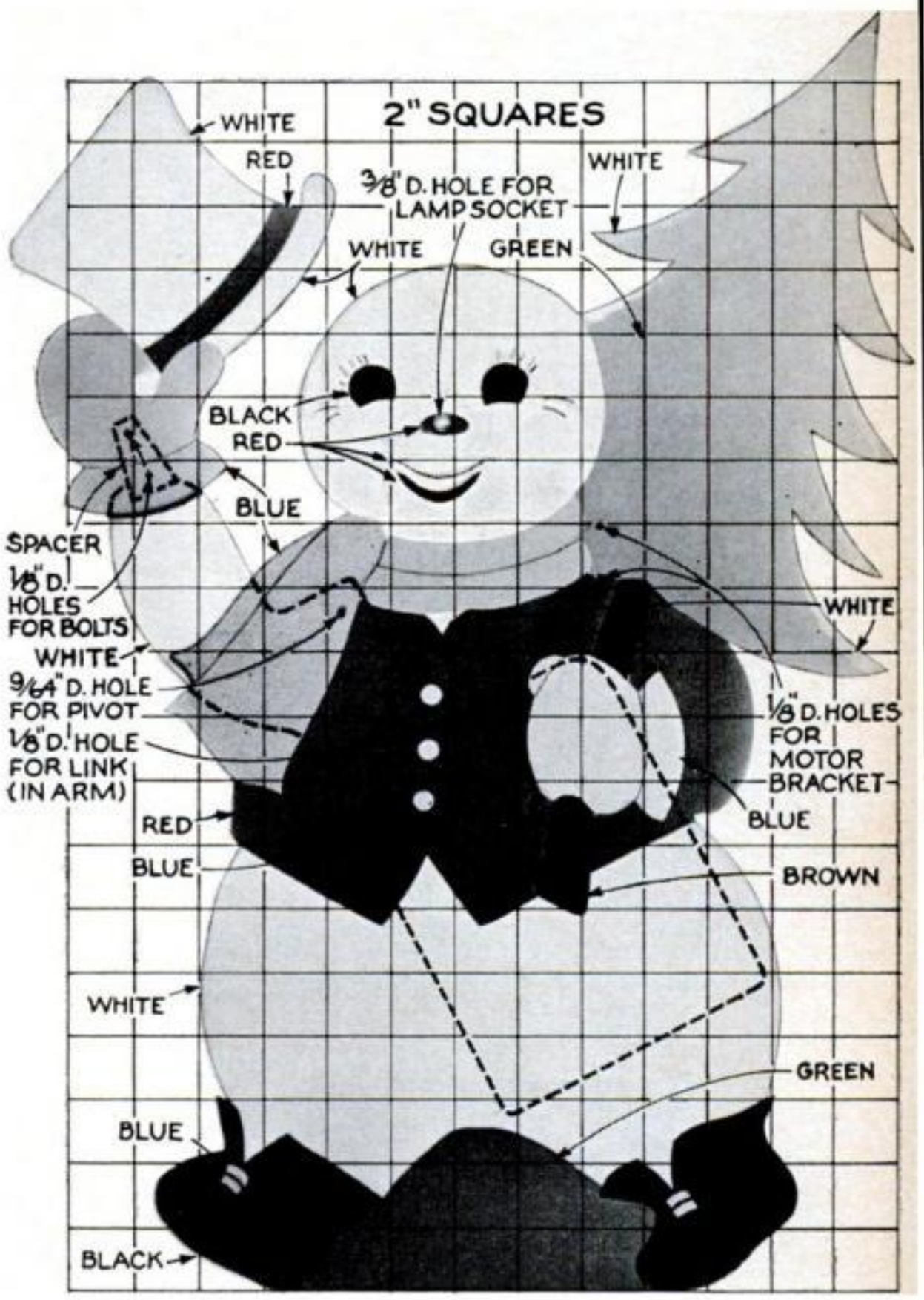
Build a Hat-Tipping Snowman

This Christmas, let an animated snowman welcome your guests and passersby. Run by a battery-operated, slow-speed motor, the snowman tips his hat and blinks his red nose.

Cut out four pieces of ⅛" hardboard as shown in the pattern—the body, the movable arm, the hand and hat, and the small spacer between the arm and hat so that the hat will bypass the head without touching it.

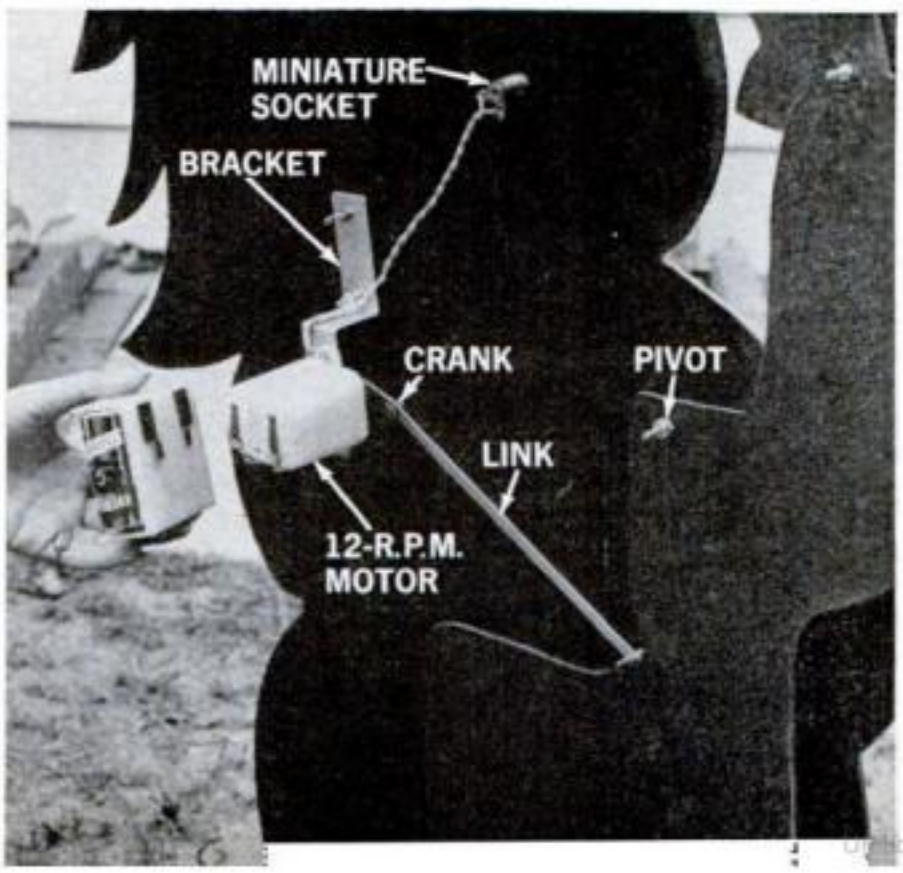
Use a three-volt, 12-r.p.m. motor to turn the links that move the arm. You can buy this from the Armor Co., Box 103, Station A, Flushing, N. Y. It costs $4.25 postpaid, and includes a battery clip and crank. No switch is required. When the batteries are inserted, motor and lamp operate. Use alkaline batteries; they give about 10 times the service of ordinary cells.

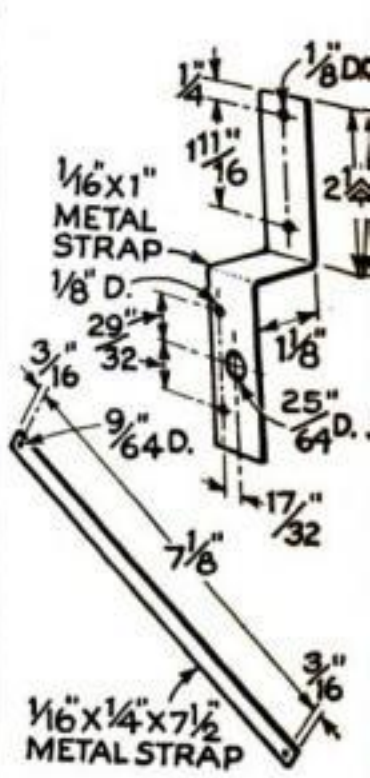
The nose, a GE No. 406, 2.6-volt lamp, blinks on and off 100 times a minute. The lamp and a miniature screw socket to fit it are available at toy stores and hobby-supply stores. Color the flasher lamp red with nail polish.



Mount on a base made from two pieces of one-by-two stock. Bolt the pieces together at one end, and screw one to the back 1" above the bottom. Stiffen by screwing a strip of scrap lumber up the back.

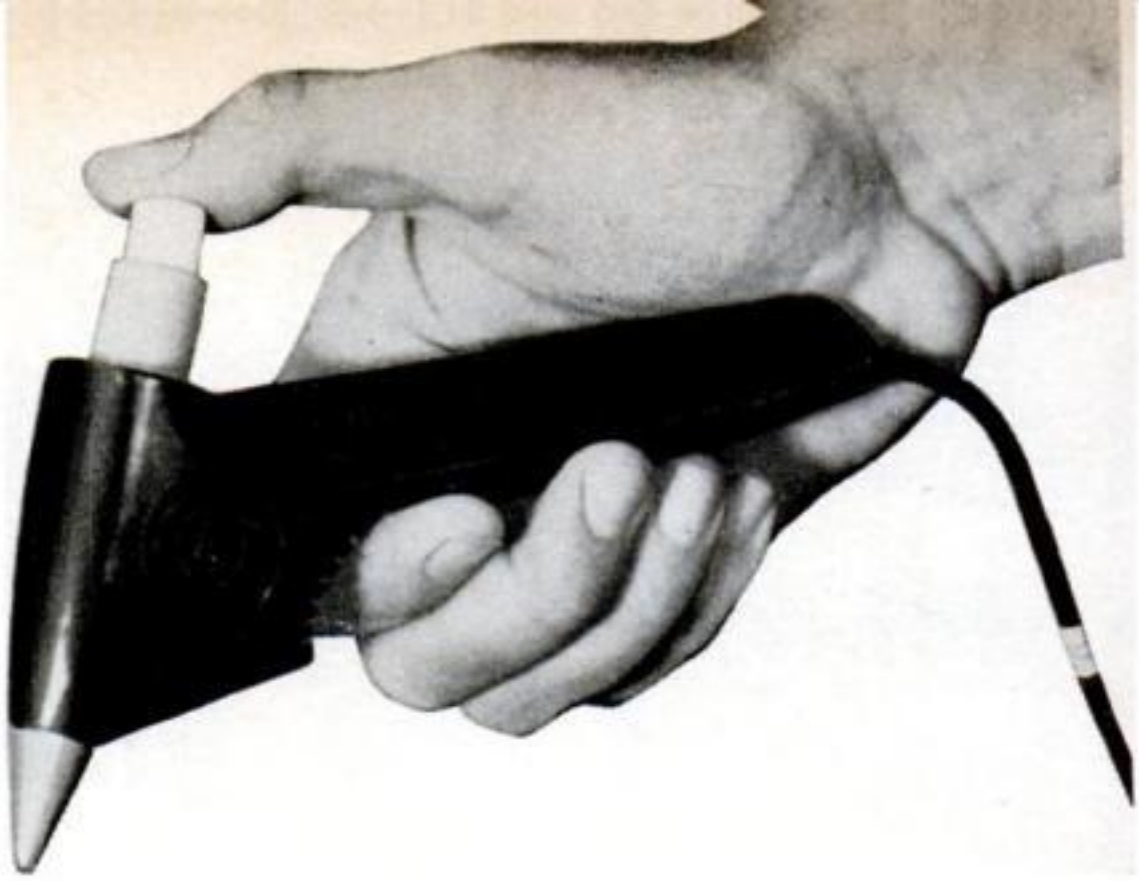
Bolt the motor to the bracket and connect the crank and arm with a metal link. Solder electrical leads to the screw socket and the clips on the motor. Batteries clip in place to operate the motor and lamp.

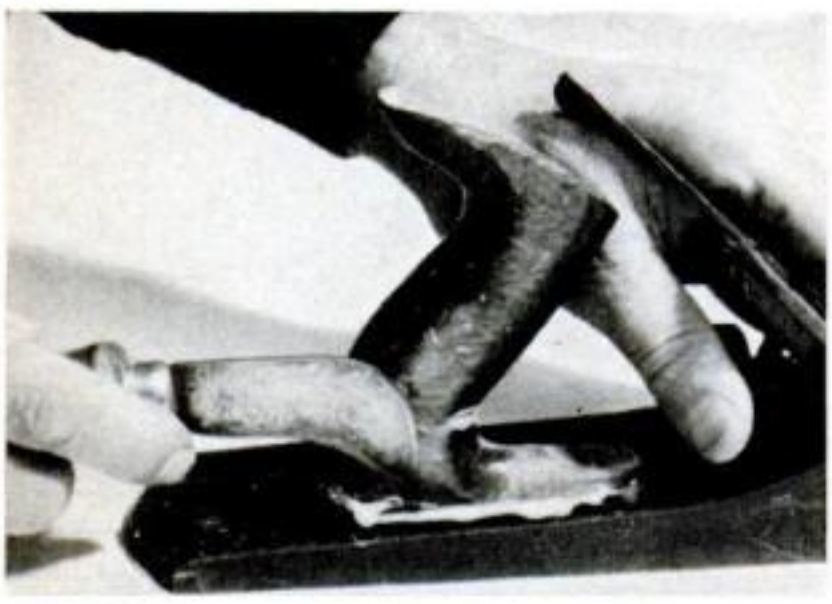




Urheberrechtlich geschütztes Material

Broken or loose chair rungs and spindles are quickly mended with the gun. The adhesive fills in worn joints with little loss of strength.





Wood-to-metal joints are made in a minute. You don't need clamps—just hold the parts together by hand. Trim off excess glue with a knife.

Recementing a car floor mat is an example of how the glue bonds a variety of materials—one reason it's handy for a lot of little repair jobs.

Caulking is done with a polyethylene-based caulk. It adheres to nearly everything and is waterproof. The gun provides good control, and its hot tip can be used to smooth the surface.

PS TOOLS

IT'S NEW!

Fast-Set Glue Gun for the Home

By JACKSON HAND

A black plastic pistol with an electrical heating element and an aluminum nozzle that extrudes hot-melt glue is one of the newest tools for home and shop.

The Thermogrip glue gun handles a polyethylene-base stick of waterproof glue the size of half a stick of schoolroom chalk. The pale-amber glue slips into the breach of the pistol. Press it with your thumb through a heating chamber, and it oozes from the nozzle, ready to use. A minute later the joint is complete, although the adhesive must cure 24 hours to reach maximum strength. You can also use the gun to apply special caulking. This is white in color.

You don't need clamps. You don't even need a particularly snug fit of the mating parts. To a greater degree than most glues, Thermogrip fills voids in the joint without serious loss of joint strength. There is no shrinkage as the adhesive hardens.

Three minutes after you plug the gun into any 115-volt outlet, the 60-watt ceramic electric heater will have warmed up the 1/16"-diameter nozzle to operating temperature of

Urheberrechtlich geschütztes Material

400 degrees. A thermostat keeps the nozzle at that temperature.

The new adhesive is like epoxy cement in that you get a lot of strength from a relatively small glue area. And it is like the contact cements in that you merely position the parts—and they stick. As a result, you can do many repair jobs that would be hard with any conventional glue.

For example, I dropped a favorite plane of mine and broke off the screw that holds the handle on. The threaded end remained bottomed in the plane bed—and getting it out seemed almost too much bother in a workshop that is wood oriented. With this adhesive, I cemented the handle on.

Another exceptional use I've made of the glue was to repair some ever-breaking spindles and stretchers in chairs of the Windsor type. A plain, square-cut butt joint is strong enough for average use, and a long-taper joint is as strong as wood itself. In either case, you merely hold the parts together. No clamps. This feature makes the adhesive great for veneer patching, too, and similar small repairs.

The adhesive works on cloth, leather, fiberglass, rubber, paper, wood, and many other materials. It does not stick well to plastics like polypropylene and Teflon, which have a waxy surface. Don't look for too much adhesion to any glassy-smooth surface unless you roughen it.

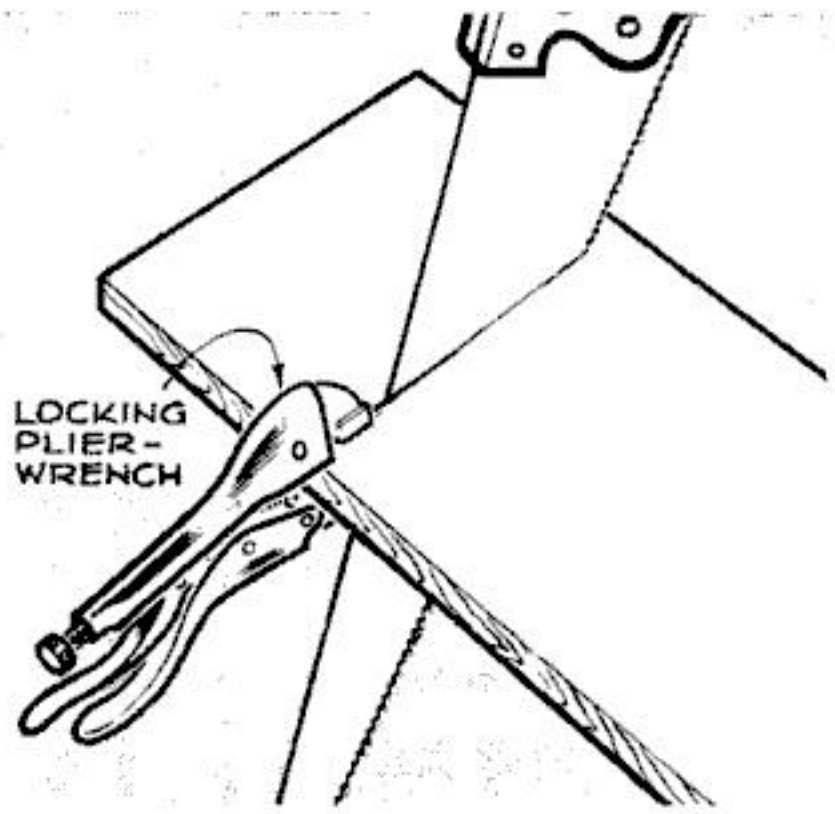
What it can't do. You can repair broken pottery, but don't expect it to hold a cup of hot tea or coffee. There are some things this glue cannot do. Basically, it is a small-job material. You cannot work it in a long glue line, because it starts to cool, and "skin over," before you get to the end.

In fact, although the instruction leaflet says you have 20 seconds in which to place the mating part in position after you spread the adhesive, the closer to zero seconds you can make it, the better.

Thermogrip will find its way into many homes, where its ability to provide a lot of glue job in exchange for a small amount of skill will be appreciated. If you make things of a fair size, however, you'll lose patience with it quickly.

B. B. Chemical Division of United Shoe Machinery Corp., Boston, is the manufacturer. (You may remember USM for their Pop Rivetool, introduced a year or so ago.) The price is $7.95 for the gun and four sticks of glue, three of caulk. Additional sticks are seven for 49 cents.

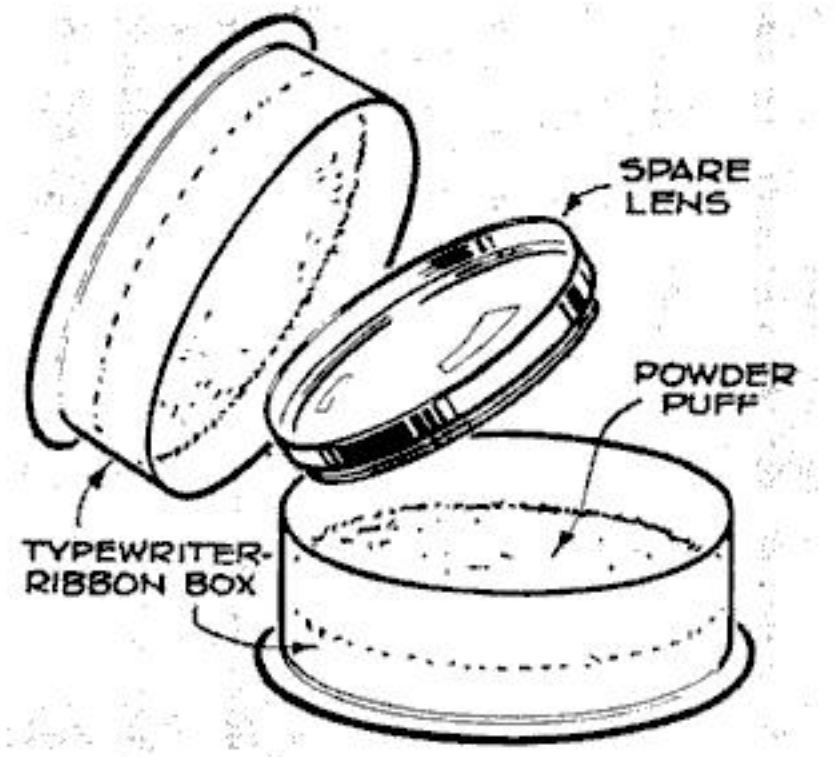
SHORT CUTS AND TIPS FROM PS READERS



Locking pliers stop saw chatter

Sawing off a little bit from the end of a wood or metal strip can be difficult because the nearly freed part chatters. This may cause the part to break or bend. Solve this by clamping the open end of the saw cut with a pair of locking pliers.

A. W. Hasson, Chehalis, Wash.



Typewriter-ribbon box protects your accessory camera lenses

Need a container to store your camera's accessory lens or filter? Try one of those metal cans that typewriter ribbons come in. For protection, line it with replacement powder puffs (available in drugstores), or small disks of foam plastic. Use rubber cement to attach the liners to the bottom and lid of the can.

A. Ladlaw, Montclair, N. J.

Urheberrechtlich geschütztes Material

PS Money-Saving Series:

IMPROVING YOUR HOME WIRING

THIS MONTH: How to install new switches

Mercury switches provide silent control. Mount them with the word "top" up, as shown. All wall switches are conventionally mounted with word "off" on toggle lever facing upward.

By HARRY WALTON

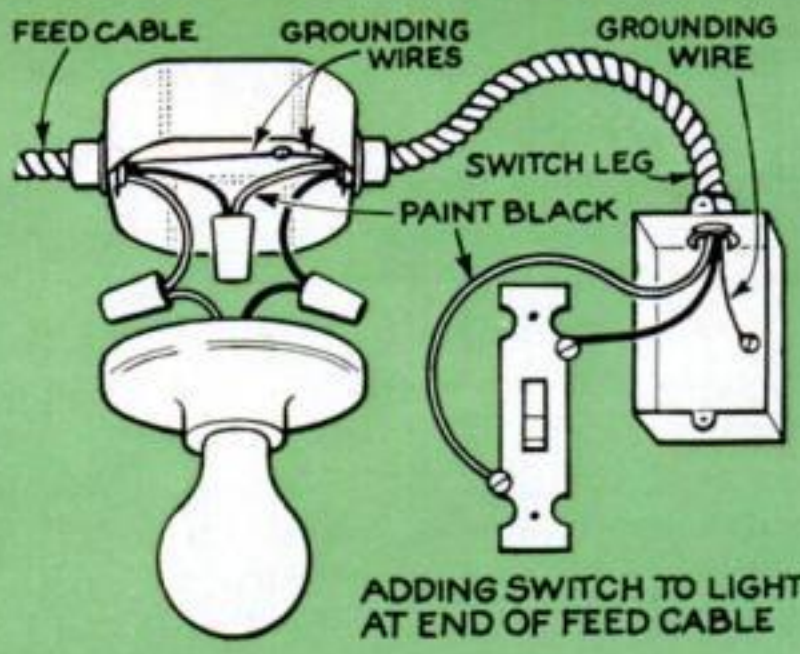
There's no law or code regulation that says you have to stumble in darkness to reach a light switch, put up with outmoded pull-chain fixtures, or wake the baby with switches that go clack in the night. You can wipe out such annoyances by installing new switches.

A switch has two brass-colored terminal screws, instead of a chrome and a brass one as outlets and light fixtures do. There's a sound reason for this.

One of the wires in two-wire cables in your electric system is black, the other white. The white wire is the grounded or neutral side of the power line. The black wire is the "hot" side. Connecting a lamp to the black and white wires closes a loop,

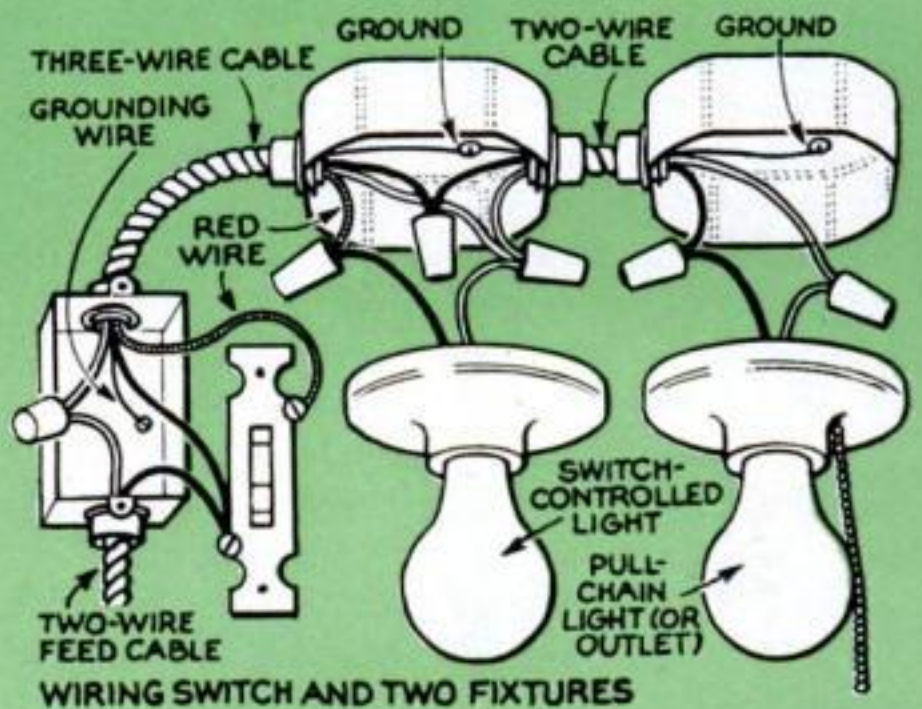
Continued

Three easy ways to wire



Simple switch circuit changes a pull-chain ceiling fixture to a wall-controlled light, above. A two-wire cable, or switch leg, is run from fixture to switch box. The original wires are disconnected from the old fixture, and the white one connected to the white wire (or the chrome terminal screw) of the new fixture. The black feed wire is joined to the white wire of the cable running to the switch. *Paint this*

How three-wire cable is used

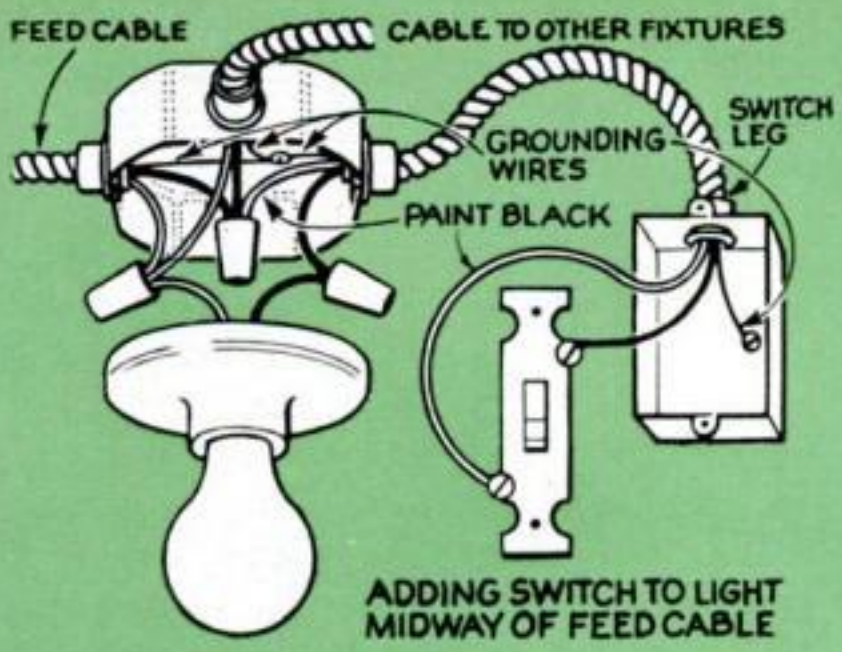


WIRING SWITCH AND TWO FIXTURES

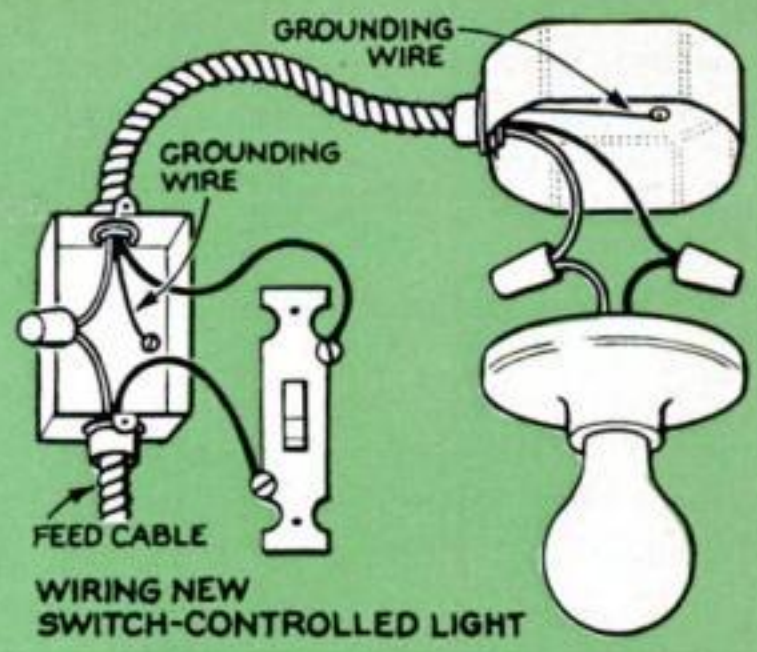
Wiring an outlet beyond the one controlled by the switch calls for three-wire cable. The white wires are spliced through the switch box. The black wire of the three-wire cable and the black feed wire go to the same switch terminal. The red wire goes to second terminal. At the other end, it is joined to black fixture wire of the switch-controlled light. In the first fixture box, the black wire is connected to the black of a two-wire cable to second fixture or outlet. Adding a switch and an **outlet to an existing ceiling light, with the feed wires entering the fixture, also calls for three-wire cable (center sketch). White**

Urheberrechtlich geschütztes Material

a switch to a light fixture



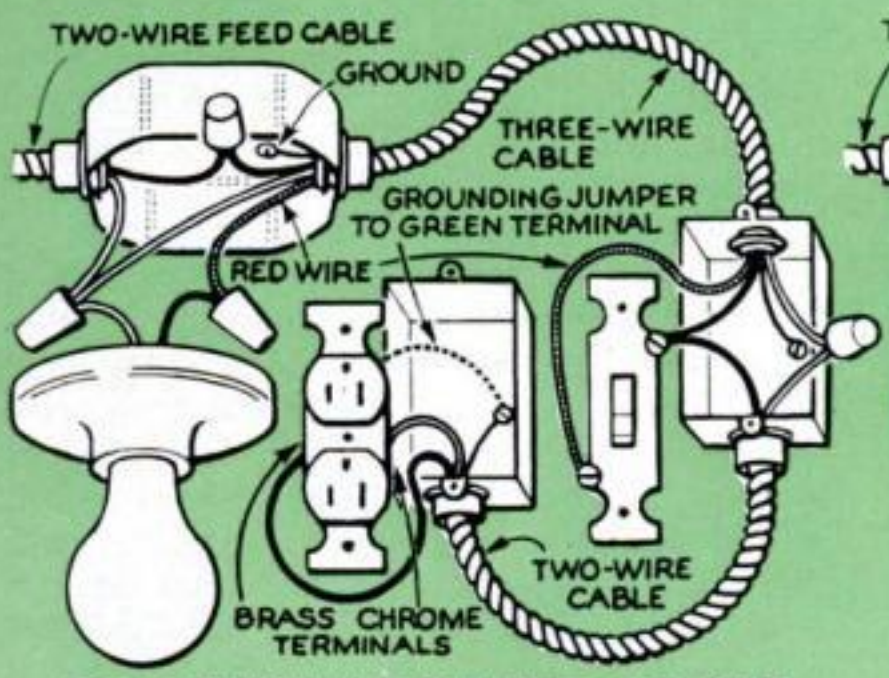
ADDING SWITCH TO LIGHT MIDWAY OF FEED CABLE



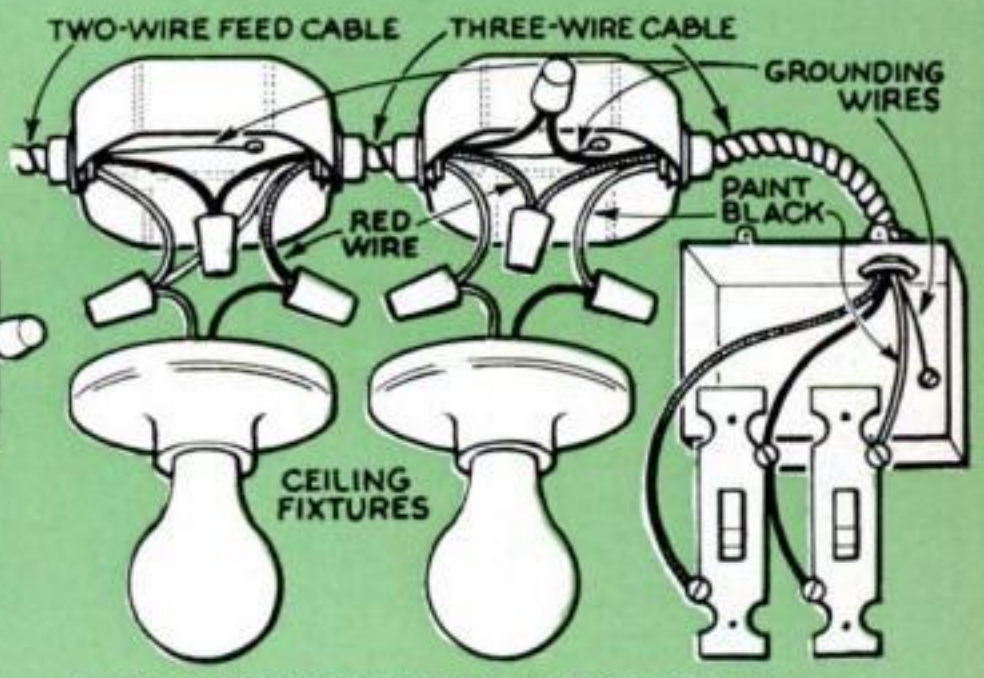
WIRING NEW SWITCH-CONTROLLED LIGHT

white wire black at both ends. The black wire of the switch loop is connected to the black of the new fixture wire (or the brass terminal screw, if the fixture has no wires). As both switch-terminal screws are brass, it doesn't matter which wire is fastened to which. Use wire nuts for wire-to-wire connections. This installation is simplest if ceiling fixture is at the end of a cable run, but connections are the same if there is wiring beyond it. Running the feed wire through the switch box saves work when you install a new fixture. Join the white feed wire in the switch box to the white wire running to the fixture. At the fixture, connect it to the white fixture wire or chrome terminal screw. The black feed wire goes to one switch terminal, the black wire from the fixture to the other switch terminal. Note grounding.

for some switch circuits



ADDING SWITCH AND OUTLET TO OLD LIGHT



ADDING SECOND FIXTURE AND SWITCHES

wires join white throughout. The black feed wire is connected to the black of the three-wire cable. In the switch box, this wire and the black of a two-wire cable both go under one switch terminal. The red wire goes to the other. Connect the black wire to the brass terminal of the outlet, the white wire to the chrome terminal. Outlets also require an insulated grounding jumper wire from the box to a green-painted terminal. If switch and outlet go in one box, two-wire cable isn't needed.

To add a second light with switches controlling it and the existing fixture, use three-wire cable between all boxes. The white feed wire is connected to the first white fixture wire and the white of the three-wire cable. In the second box, the white wire is joined to the white fixture wire (or chrome screw) only. The black wire is joined through at both boxes (black to black) and finally connected to one terminal of each switch. The red wire is fastened to the second terminal of one switch, joined red to red in the second fixture box, and connected to the black fixture wire in the first. The white wire of the three-wire cable connects the second terminal of second switch to black wire (or brass terminal) of second fixture.

Urheberrechtlich geschütztes Material

letting current flow. A switch is a handy means of breaking the loop.

As a safety measure, the white side of house wiring must be continuous. Therefore the National Electrical Code prescribes that switches must be connected *only* in the black (hot) side of the line. That's the reason for the two brass terminals on a switch, brass being the code color for hot terminals.

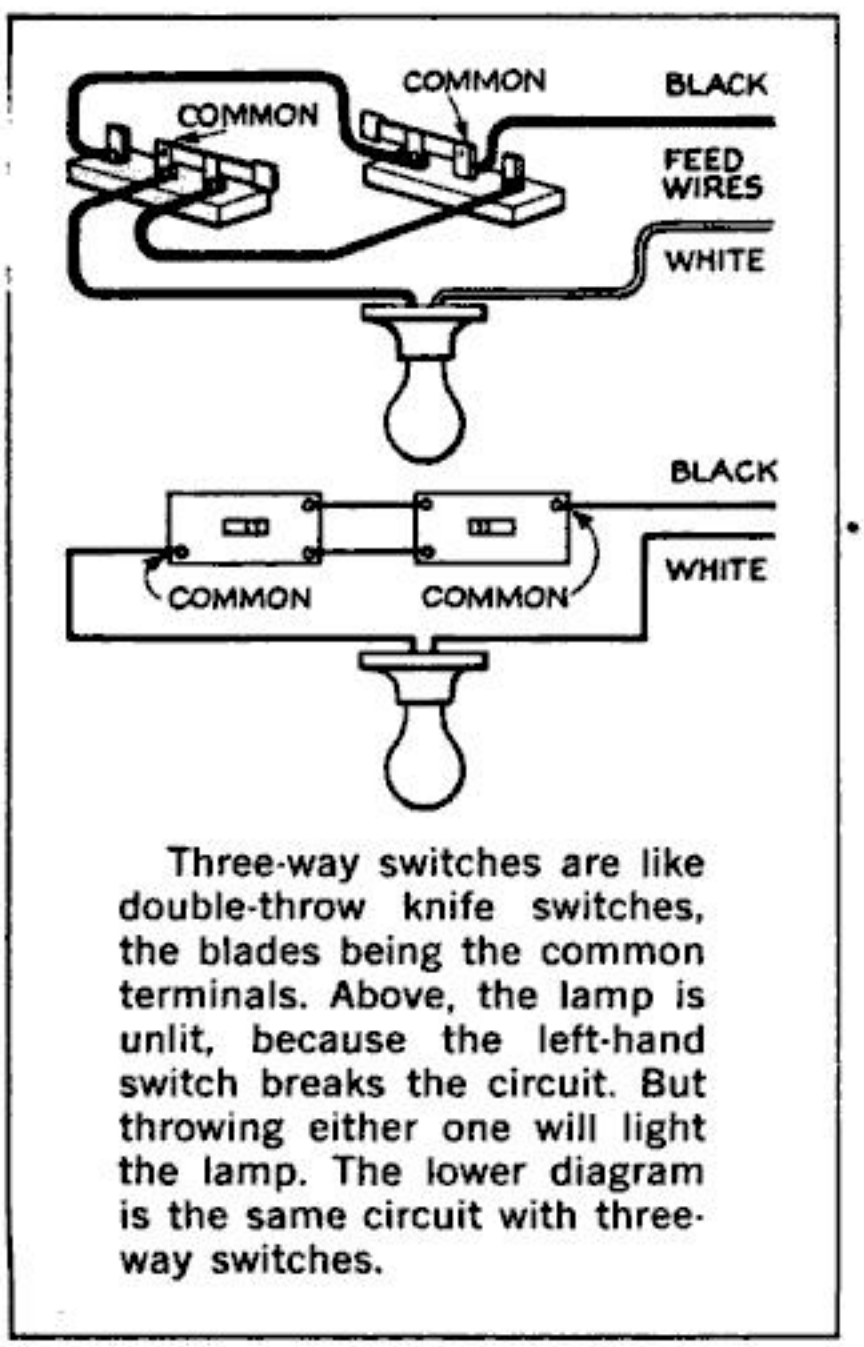
In installing a switch leg with armored or nonmetallic cable, however, the white wire is connected to the black feed wire as a matter of necessity because armored or nonmetallic cable with two black wires isn't available. Code regulations require this to be corrected by painting both ends of the white switch wire black. When conduit is used for switch-leg wiring, two black wires are run through it.

Three-wire cable has, in addition to black and white wires, a red wire; the color codes it as hot. Three-wire cable comes in armored and nonmetallic types, with and without the bare grounding wire now required by the National and many local electrical codes.

It's important that you connect these grounding wires properly at both fixture and switch boxes. New boxes have screws for fastening the grounding wire; in old boxes, use a clip made for the purpose.

Where to install switches. A room light should be controlled by a switch at the latch side of the door. If there are two frequently used doors, a three-way switch at each can control the same fixture.

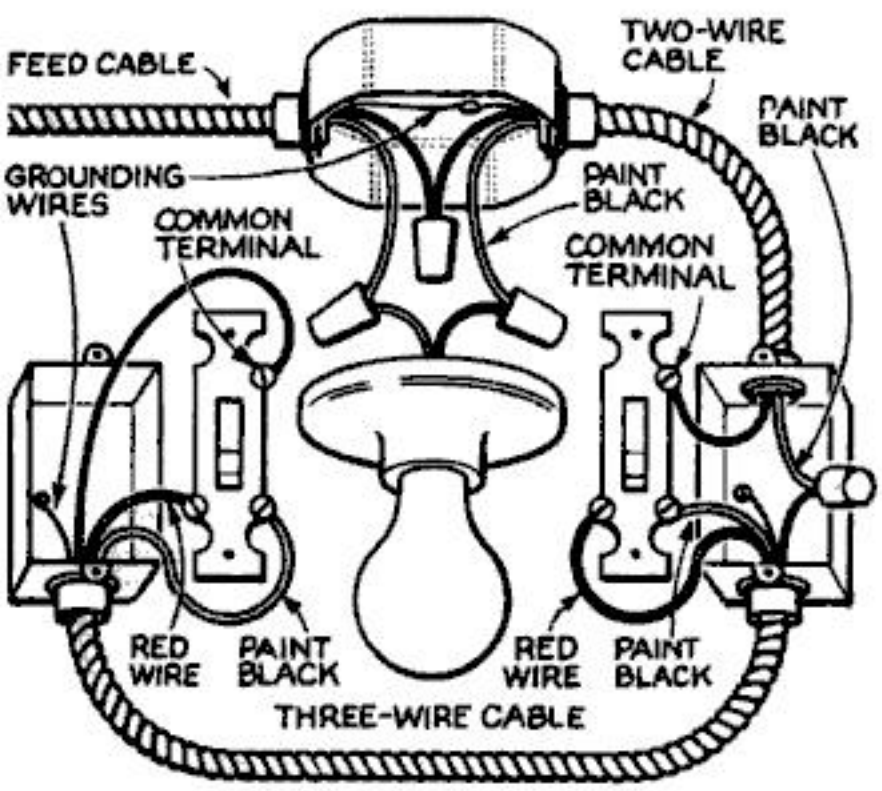
Never install bathroom switches within



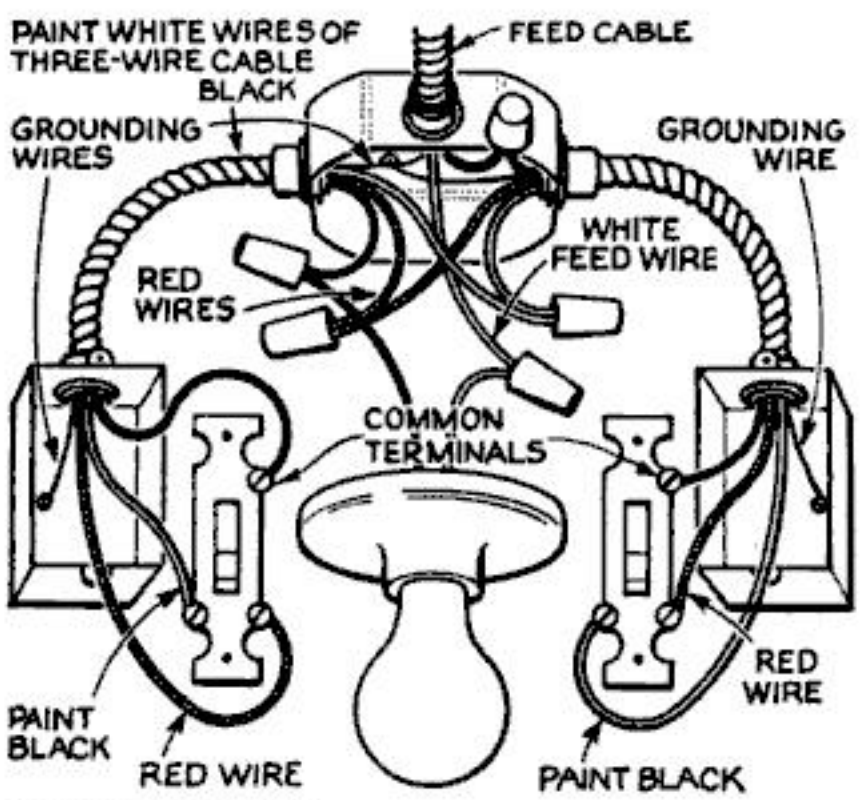
Three-way switches are like double-throw knife switches, the blades being the common terminals. Above, the lamp is unlit, because the left-hand switch breaks the circuit. But throwing either one will light the lamp. The lower diagram is the same circuit with three-way switches.

Wiring switches that turn lights

Three-way switches control a light from two locations. These have three terminal screws, two brass-colored and one copper, bronze, or black. The dark screw is a common terminal. Three-wire cable is needed for all or part of the switch run. If the feed wire enters the fixture box, two-wire cable is used between it and the first switch (below, left). The white feed wire connects only to the white fixture wire or chrome screw. The black feed wire, joined to the black switch wire, is connected to the common terminal of the first switch. The white wire of the two-wire switch cable, joined to the black fixture wire or brass fixture screw, is painted



CONNECTING THREE-WAY SWITCHES BEYOND FIXTURE



WIRING FIXTURE BETWEEN THREE-WAY SWITCHES

Urheberrecht ch geschütztes Material

reach of anybody standing in the tub or shower. Locate stair-light switches where they can be snapped on before one steps on the stairs. In a dark location, consider using a switch with a built-in pilot light.

Ordinary switches are rated 10 amps at 125 volts and are suitable for most household applications. Use switches of higher rating for multiple-light installations, large motors, or appliances.

When adding a switch to a ceiling fixture, don't remove the fixture box. Remove the handiest knockout, run a fish tape through it above the ceiling, and bring it out at the switch opening in the wall.

Prepare the cable by exposing about 8" of the wire. In armored cable, insert a fiber bushing between armor and wires. Fasten a connector on the cable, leaving off the nut. Hook and bind the cable to the fish tape, tape the joint to streamline it, and pull the fish tape through from the fixture box, using a second fish wire. Work the cable connector into the knockout, detach the fish tape, turn on the nut, and tighten it by hitting a screwdriver set in its notches.

Running the cable. You may have to run cable crosswise of joists and studs. One route is through an accessible attic. Bore a hole from the attic through the plate at the top of the wall between the studs where the switch is to be. Run cable along joists when possible. To run it across them, bore holes in the joists or strap the cable to one-by-two "running boards" nailed across the joists.

If the attic is floored, some boards will have to be taken up. Bore or notch joists where the cable must cross, so that flooring may be replaced without pinching it. Be careful not to drive nails into the cable when renailing the floor.

If there is a second floor, a cable from a ceiling fixture can be run along a joist space and into the wall, either to the switch or into the cellar (where it can run across joists and up again).

Take off the baseboard in the room

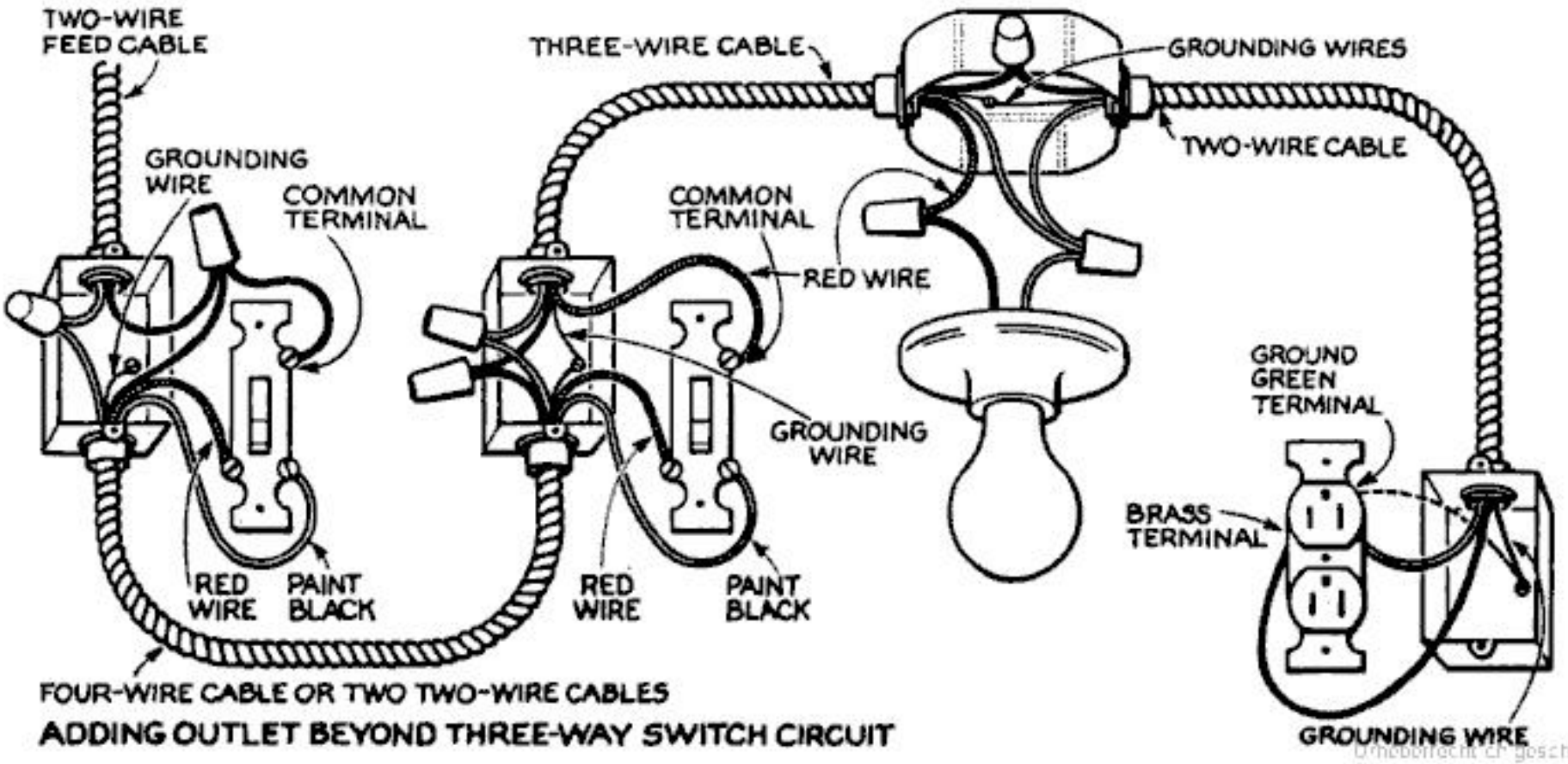
Continued

on and off from two locations

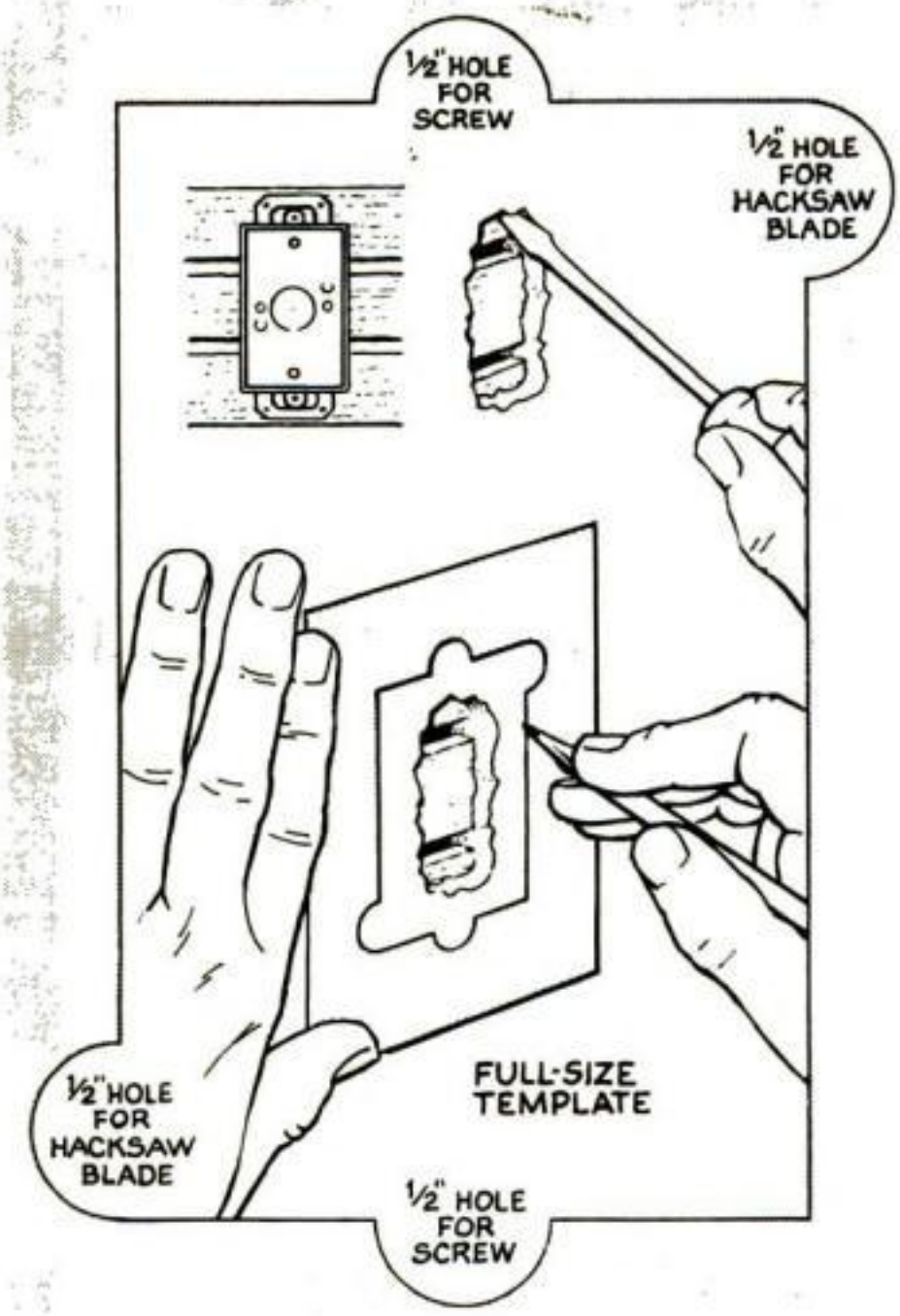
black there and in the switch box. So is the white wire of the three-wire cable joining two of the other switch terminals.

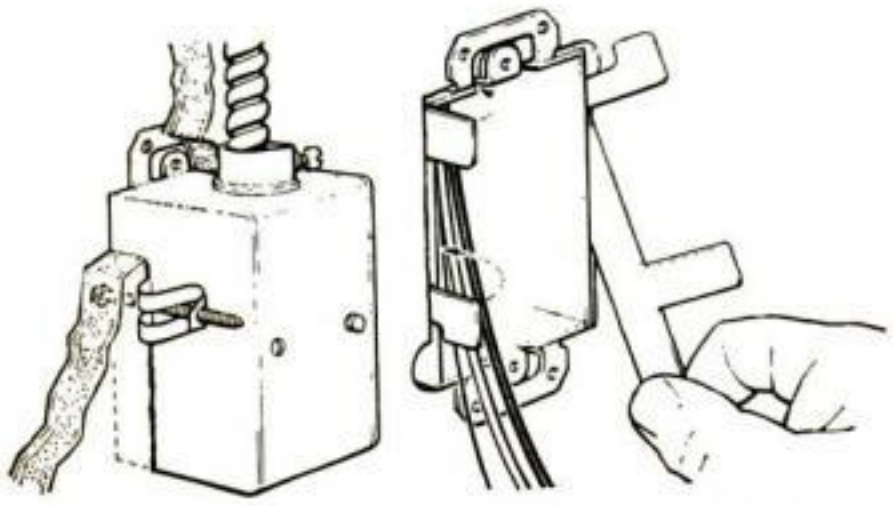
If the light is between the two switches, their connections are spliced through in the fixture box, red to red and white to white. Again, all ends of the white wire in the three-wire cable are painted black. But the return lead from the common terminal of the second switch to the black fixture wire is made through black wire.

An outlet can be added beyond a three-way switch circuit as below. This calls for four-wire cable (or two two-wire cables) between the switch boxes, three-wire cable between the fixture and the nearer switch, and two-wire cable from fixture to outlet. With the feed cable entering the farther box, the white feed wire is carried through both switch boxes, tapped off for the white fixture wire, and fastened to the chrome terminal of the outlet. The black feed wire goes to the common terminal of the first switch but is also carried through the second switch box and the fixture box to the brass outlet terminal. The red wire of the three-wire cable joins the common of the nearer switch to the black fixture wire. Other terminals of the two switches are joined by the remaining two wires of the four-wire cable, the white one being painted black to indicate it is hot.



ADDING OUTLET BEYOND THREE-WAY SWITCH CIRCUIT



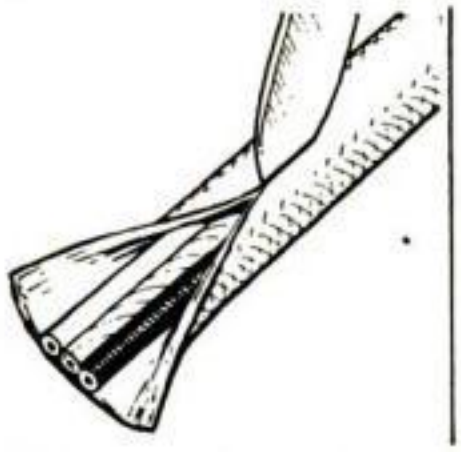


To install switch boxes, chop out enough plaster to expose one lath full width and part of those above and below it. Center the template (at top above) on the middle lath and mark its outline. Bore the four holes. Use a hacksaw blade with the teeth pointing toward you to saw on the pull stroke. Cut away all the middle lath, but only part of the other two, breaking out the part between the cuts. Put connectors on the cables and install them in the box. Use 90-degree connectors where cable bends would be sharper than minimum permissible radius. Secure boxes with No. 5 wood screws, or use metal strips that hook behind the wall and are bent over inside the box (above, right) to hold it. You can also use boxes with built-in draw clamps as at left.

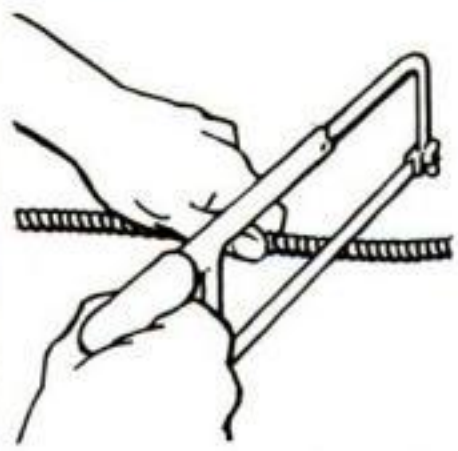
NEXT MONTH:

Wiring a New Part of Your House

The right way to cut and prepare



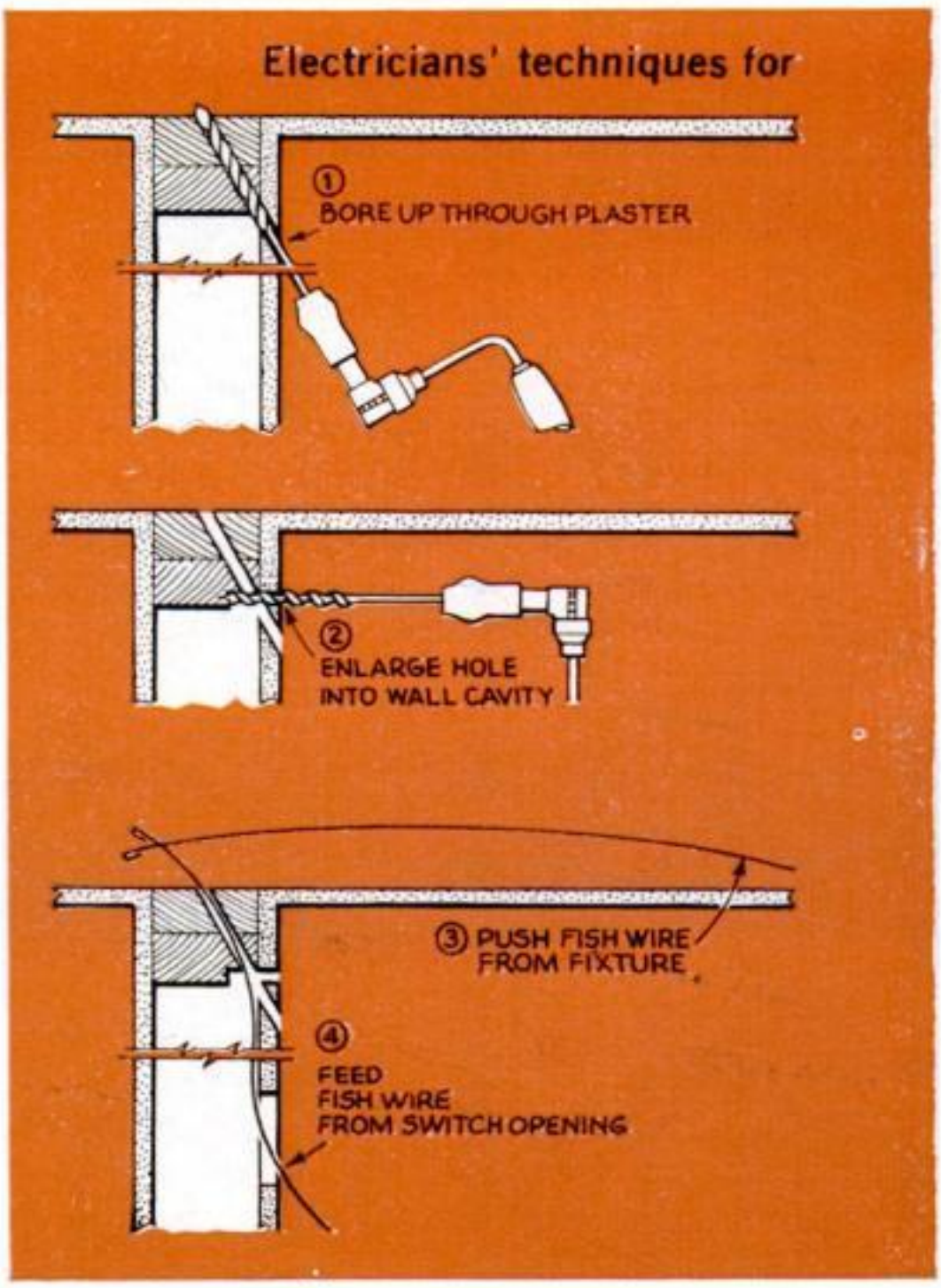
Free wires of nonmetallic cable by slitting covering with knife tip.



One way to cut armored cable: Saw diagonally, then twist armor.

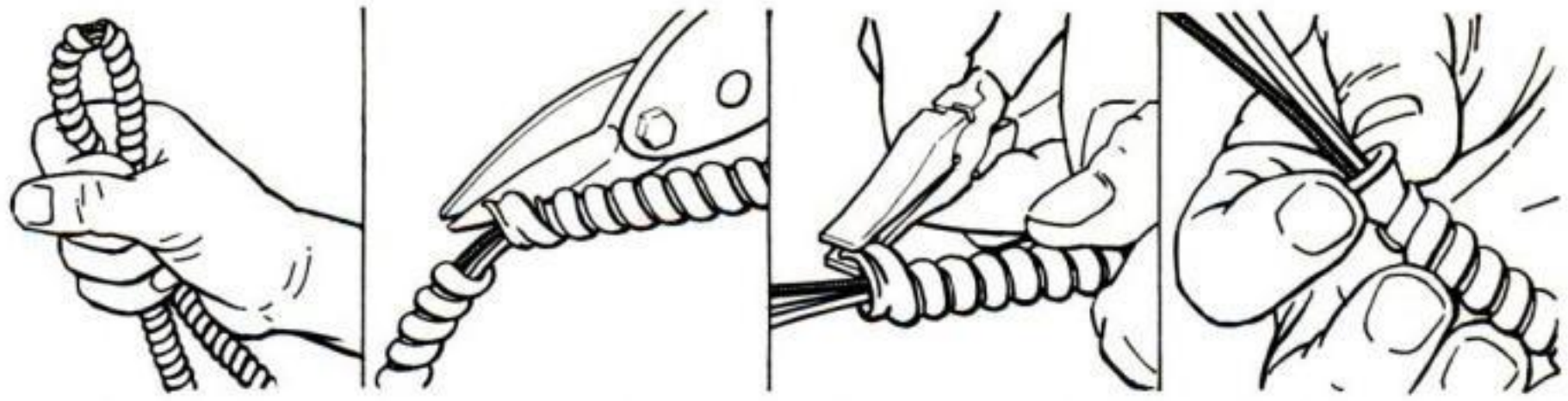
above and bore down from the corner. Use a bit big enough to make a hole through which a cable connector can pass. Two fish wires are hooked together in the ceiling. The one from the fixture is pulled out at the switch opening and the cable attached.

If the attic is inaccessible and there is no second floor, bore upwards from 2″ below the ceiling line through the plate. Then bore horizontally just below this hole. Finish the passage through the lower two-by-four with a chisel. Feed a


Electricians' techniques for
① BORE UP THROUGH PLASTER
② ENLARGE HOLE INTO WALL CAVITY
③ PUSH FISH WIRE FROM FIXTURE
④ FEED FISH WIRE FROM SWITCH OPENING

Urheberrechtlich geschütztes Material

nonmetallic and armored cables



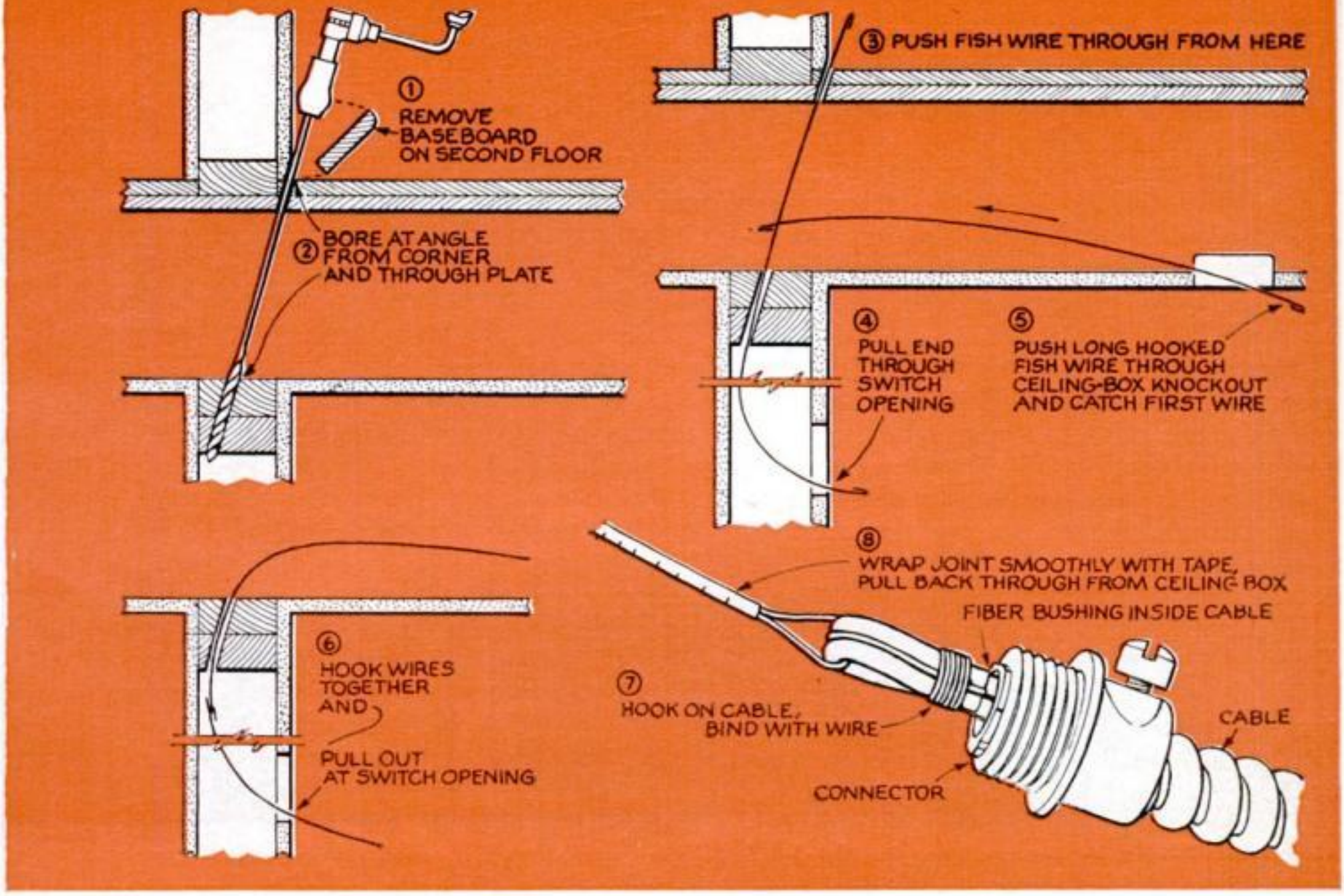
Armored cable also can be cut by first buckling the armor. Twist cable against spiral to lift armor. Then snip the armor; slide it off if you're freeing wires at cable end. Use pliers to reshape snipped armor so it won't chafe the wires. Finally, slip fiber bushing around wires and into the armor.

fish wire through the fixture knockout, catch it with a short one pushed up the plate, and work the long wire out the switch opening.

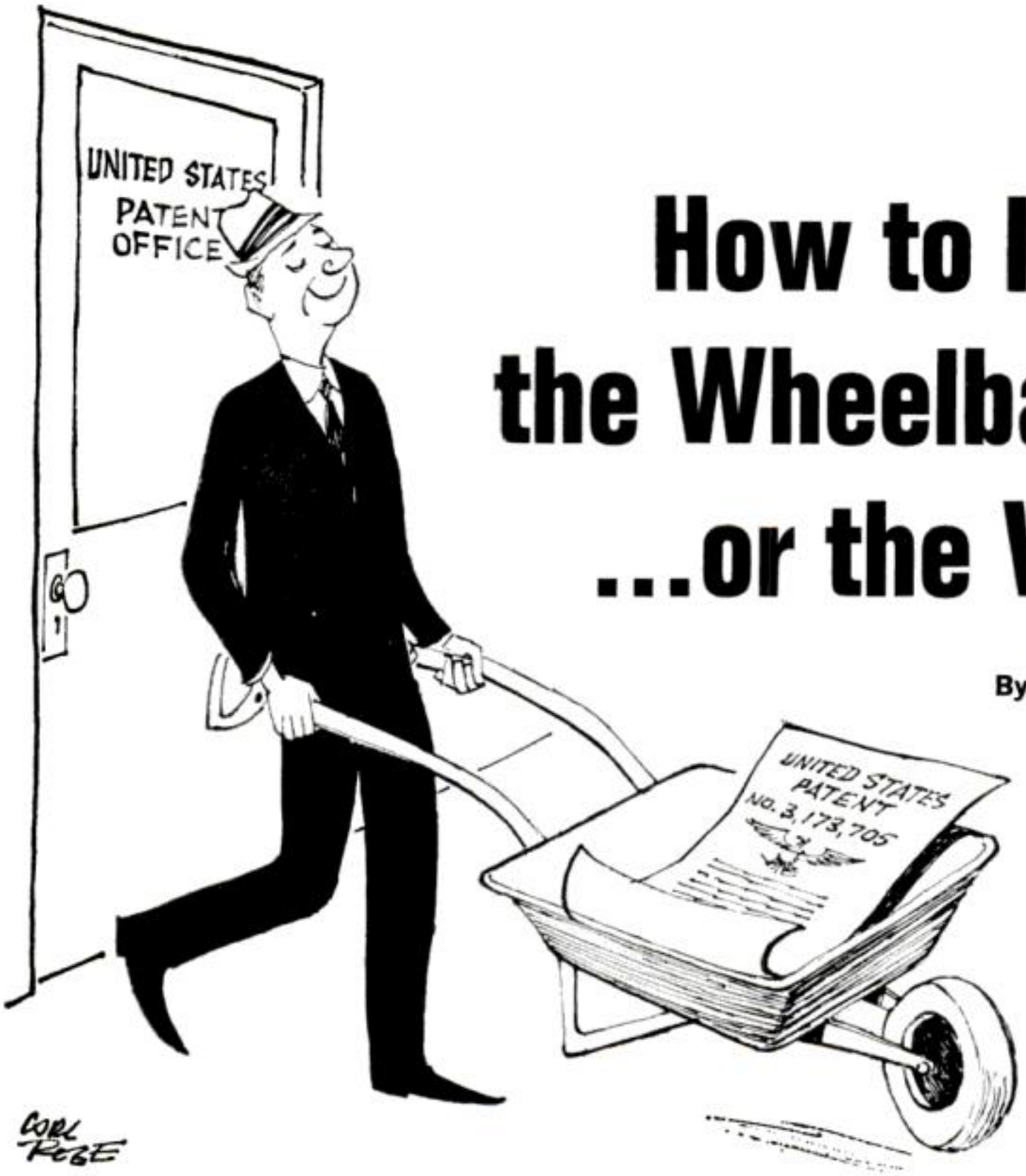
To reach other stud spaces where an attic run isn't feasible, you can carry the cable through the basement or across the baseboard space. Where the cable must enter the cellar through an outside wall, bore upward through the subflooring and sole plate at an angle. In partition walls, simply bore straight up. Run the cable along the sides of floor joists when possible. Bore holes in joists to run cable crosswise, or fasten it to running boards nailed under the joists. Keep bends within permissible minimums—five times the diameter of nonmetallic cable, seven times that of armored.

To run cable in the baseboard space, remove the baseboard and cut small holes through the wall where the cable will emerge and return. Between these, notch out the plaster or wallboard deeply enough to receive the cable. In a plaster wall, this is easiest between two laths. If the channel cannot be made deep enough, chisel a matching channel in the baseboard. PS

running cable from ceiling lights to wall switches


① REMOVE BASEBOARD ON SECOND FLOOR
② BORE AT ANGLE FROM CORNER AND THROUGH PLATE
③ PUSH FISH WIRE THROUGH FROM HERE
④ PULL END THROUGH SWITCH OPENING
⑤ PUSH LONG HOOKED FISH WIRE THROUGH CEILING-BOX KNOCKOUT AND CATCH FIRST WIRE
⑥ HOOK WIRES TOGETHER AND PULL OUT AT SWITCH OPENING
⑦ HOOK ON CABLE, BIND WITH WIRE
⑧ WRAP JOINT SMOOTHLY WITH TAPE, PULL BACK THROUGH FROM CEILING BOX
FIBER BUSHING INSIDE CABLE
CABLE
CONNECTOR

Urheberrechtlich geschütztes Material



How to Invent the Wheelbarrow ...or the Wheel

By THEODORE IRWIN

Here's the hilarious story of one of the wackiest things that ever

Well, as we heard the story, there was this man who had an idea for improving the wheelbarrow. Not *inventing* it, mind you—just adding a little something to make it more tractable.

Seems that a wheelbarrow is not the easiest thing in the world to control. It's not balanced. Try to dump a load from it, and you've got to tilt it sideways—awkward; or flip the handles straight up and out in front of you—putting the contraption *really* out of control. You've lost it, as the racing drivers put it.

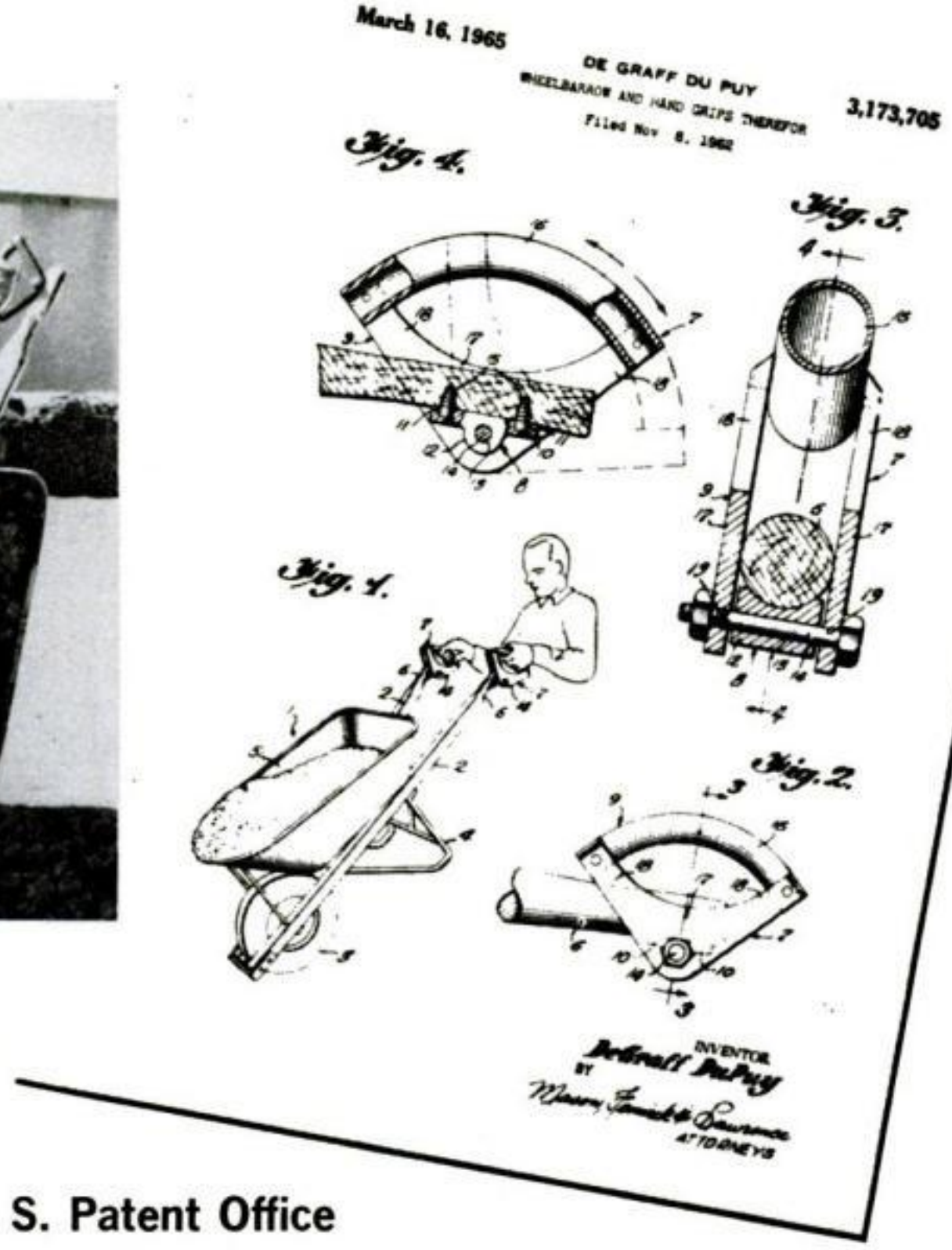
Well, as we say, here was this man. DeGraff DuPuy. Tall guy. Civil engineer. Worked on construction jobs all over the world—Greece, Greenland, France, Colombia, you name it. One day while working at the Gatun Locks in Panama he saw a native workman lose control of a wheelbarrow full of concrete. Come to think of it, he had seen barrows get away from men lots of times. He got to pondering.

Cut and try. After several years of tinkering, he came up with some curved, movable grips to fit the barrow handles. Worked like a dream. Kept a barrow under control when you dumped it. So he applied for a patent. And in due course along came this document with a red seal, all engraved, Patent No. 3,173,705, for "Wheelbarrow and Hand Grips Therefor."

"Holy smoke!" breathed DeGraff DuPuy. "I've got a patent on the wheelbarrow."

Now, *The Wheelbarrow*, as everyone knows, has been in use since ancient times. Why his patent attorneys phrased the application as they did, DuPuy doesn't know. But there it was, in black and white, from the U.S. Patent Office. Not just "Hand Grips Therefor" but "Wheelbarrow *and*—" DuPuy hied himself back to his attorneys. Yup, said they, it sure looked as though he had a patent on the wheelbarrow.

Urheberrechtlich geschütztes Material



A patent application for his handgrips brought inventor DuPuy (above) a patent on the wheelbarrow as well (right).

happened to the U. S. Patent Office

DuPuy got pencil and paper and sat down in his home in Roanoke, Va., and began figuring. There were some three million wheelbarrows produced each year, by 43 U.S. manufacturers, for construction work alone, not counting millions of others for home gardeners and farmers. DuPuy's attorneys sent letters to all 43 makers of construction job barrows, notifying them of the patent just in case of future litigation for infringement. DuPuy was in a fever.

Afterthoughts: It would be nice to report that DuPuy did it. Invented the Wheelbarrow. Got rich. What actually happened, of course, is that pretty soon he began to calm down. If it was that easy, why hadn't someone else done it since the coinage of Article I, Section 8 of the Constitution of the United States: Congress shall have the power "to promote the progress of science and the useful arts by securing for limited times to authors and inventors the exclusive rights to their respective writings and discoveries."

But that only partly stopped DuPuy. What really hit the fan was the Patent Office rule that anything in public use for more than one year, on which no application for a patent has been filed during the year, is public property and cannot be patented. And it would be hard to argue that the wheelbarrow hadn't been in use.

DuPuy's patent on his handgrips is as good as gold, though. He's negotiating with a major manufacturer to produce them.

Funny thing. Nothing exactly like this ever happened to the U.S. Patent Office before, and it seems that a lot of people have gotten the idea of inventing the hammer, the monkey wrench, or even the wheel. Maybe that's why the Patent Office is busy filling requests for copies of DuPuy's No. 3,173,705, "Wheelbarrow and Hand Grips Therefor.".

Urheberrechtlich geschütztes Material

Gus Helps Santa Get Going

Neither rain nor snow—nor battery failure—could keep Gus from hurrying to the aid of Operation Christmas Tree

By MARTIN BUNN

Driving back that December night from his yearly pre-Christmas visit with old friends in the country, Gus Wilson could smell snow on the way. The tires of his coupe hummed on bare pavement, fell silent as they rolled over patches of old snow.

It was nearly midnight, and there hadn't been another car in five miles. The '62 Pontiac standing on the shoulder came as a complete surprise. Instinctively, Gus slowed. Waving wildly, a figure jumped out of the car. Gus stopped behind it.

A tall girl in slacks and a loose coat ran up to him.

"Thank heaven! I thought nobody would ever come. Please help me. It's urgent."

"What's wrong, a flat?" asked Gus.

"Yes—no. I had one, but fixed it. An awful job, but Tim once showed me how, so I managed. Only now the car won't start. Battery's dead. How about a push?"

Something white loomed ahead. Gus got out to look. It was a culvert post, hardly a yard from the Pontiac's front bumper.

"Can't push you," he said. "You'd have to back first to get around that—and I haven't got a tow chain."

She stamped a foot, the coat flapping. "I just *have* to get moving. Do you have those wires to help out a bad battery?"

"Booster cables? No. Sure it's dead? Did it start the engine when you left?"

"It did not," she retorted angrily. "A brand-new battery, too, only a week old. A neighbor had two thick wires he ran from his own battery to get the engine started. But I stopped it to change that darned tire."

Gus opened the Pontiac's hood. His flashlight beam found the battery, clean and evidently new, its terminals thick with grease. He fingered it.

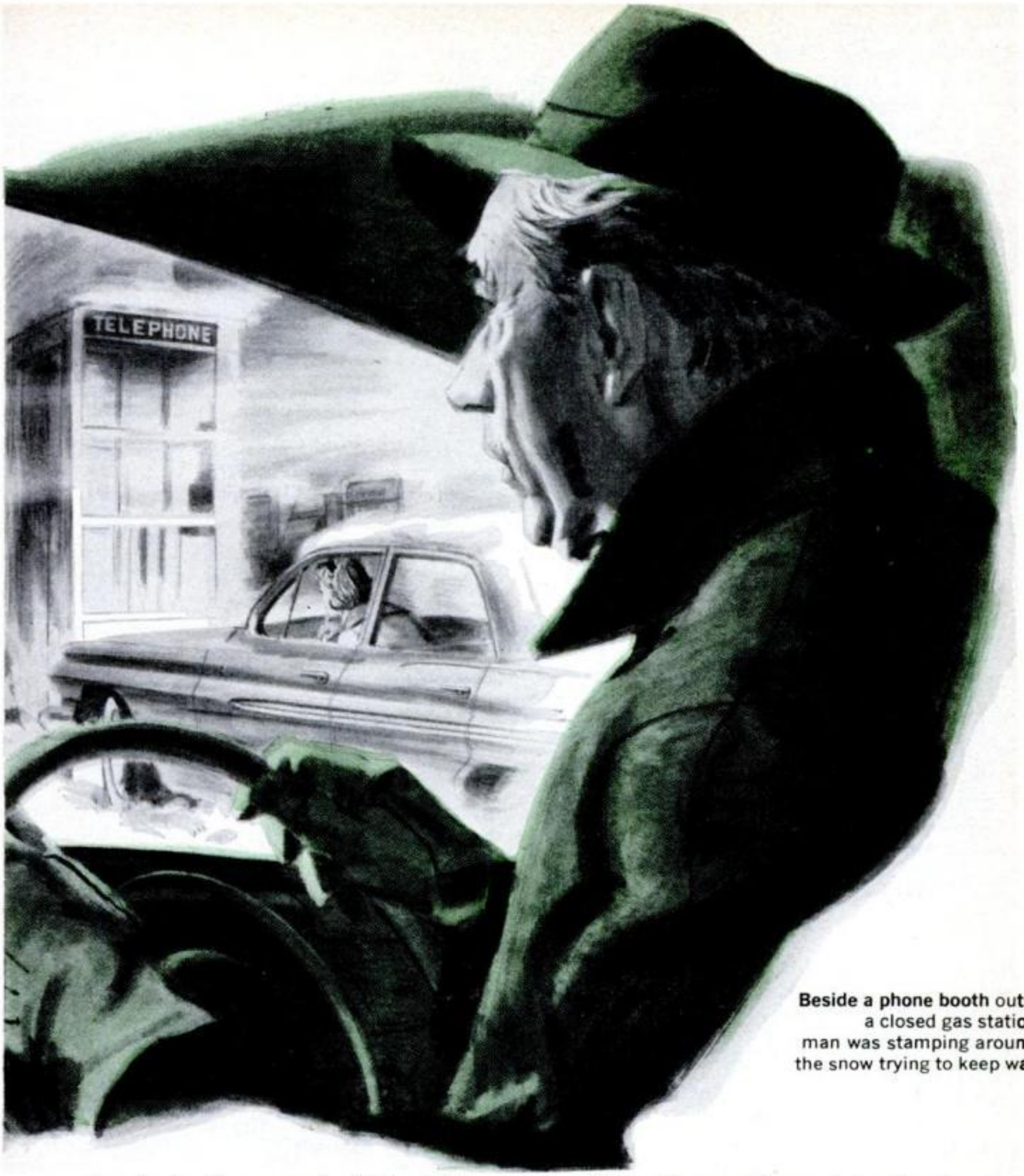
"Try starting the engine," he said.

The girl jumped behind the wheel. Keys rattled. The starter solenoid clicked, flew back, clicked again.

"That's all it does," called the girl.

Gus twisted one of the spring-clip battery

Urheberrechtlich geschütztes Material



Beside a phone booth outside a closed gas station, a man was stamping around in the snow trying to keep warm.

terminals. It snapped off the battery post. He disconnected the other also, then went to his own car for a rag. With it he wiped the grease off the posts and clamps.

"Your battery may not be dead," he told the girl. "These terminals maintain contact only by spring tension, which isn't always reliable. Besides, somebody put on the wrong kind of grease to prevent corrosion. It melts from engine heat and runs between the post and the terminal clamp, making a poor contact worse. A connection like that may pass enough current for the lights, but not heavy juice for the starter."

Replacing the cleaned terminals, Gus worked them back and forth to get a good bite on the posts, then nodded to the girl.

The starter whirred as she turned the key. Three seconds later the engine was running nicely. Gus closed the hood. The whole incident hadn't taken 10 minutes.

It took Gus as many seconds to realize the girl was staring at him.

"Nothing else wrong, is there? Those

Continued

Urheberrechtlich geschütztes Material

terminals will hold for now. Later you can get new cables with bolted terminals."

"Oh, who cares? That's the least of it."

It was Gus's turn to stare. Suddenly the girl's tense face broke into a smile.

"I'm sorry. You must think I'm awfully ungrateful. It's not that—I'm worried about something else—Tim and the pickup. You do know about cars, don't you?"

Gus nodded, still puzzled.

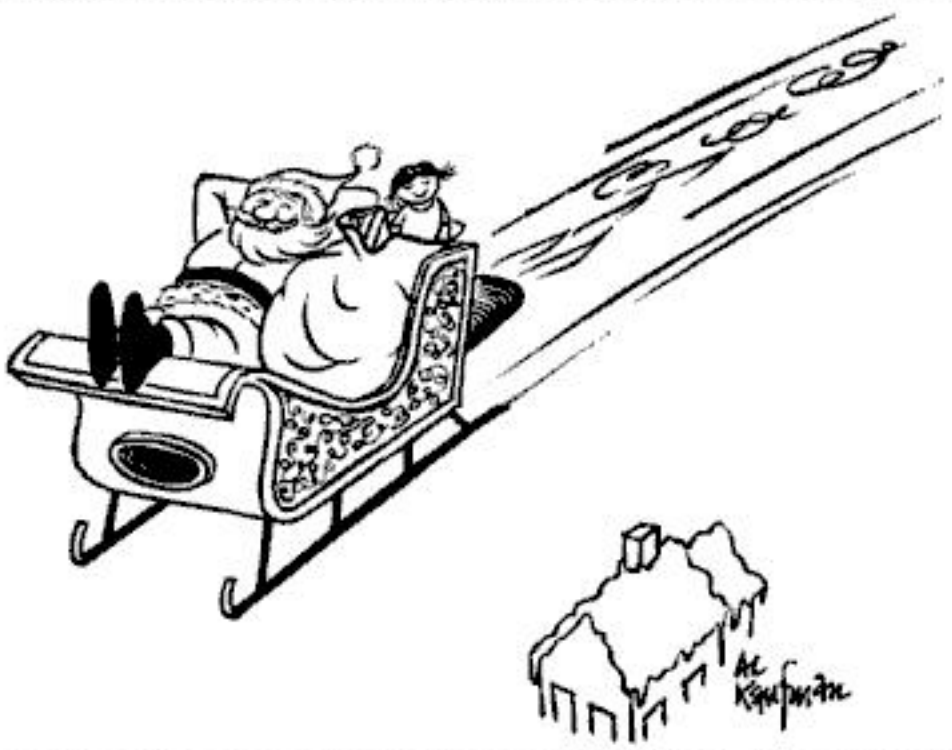
"Tim's my boy friend. He drove north for a load of Christmas trees. He has to deliver them all before midnight tomorrow, the day before Christmas, or he'll lose the money he needs for college. And he's stuck on route 35.

"He did get to a phone, but all the garages or service stations are either closed or won't send help this far. He tried to phone the man he rented the pickup from—a gardener—but couldn't reach him." Her voice rose an octave. "Oh, no! It's beginning to snow!"

"Where on 35 is he?" asked Gus.

"He phoned from Burnly. He's waiting for me there."

"Okay. Drive on and I'll follow."



Snow was thickening but the girl drove briskly, just below the threshold of recklessness. At times Gus lost the Pontiac's tail lights in the swirling flakes. In 20 minutes they had reached Burnly, a silent village sleeping under the snow.

Beside a phone booth outside a closed gas station a man was stamping around trying to keep warm. The girl's car swooped down on him. Its door flew open. A minute later the man trudged over to Gus.

"Hello. I'm Tim Collins. Betty told me how you rescued her. Thanks a million for that, and for coming out to help me with the pickup. Okay if I ride with you to show you where it is? Betty will follow us."

"Hop in out of the cold," said Gus.

Collins wasn't much more than 20. Face reddened with the cold, he shivered a bit as the cab's warmth soaked into him. Gus drove around the Pontiac, heading west.

"So you're hauling Christmas trees?"

"Yes," said Collins. "Though my big idea looks as if it's fizzling out."

"Does seem late in the season to be trucking trees south," remarked Gus.

"But that was the idea! Commercial trees are brought in weeks early. They're already dried out when people buy 'em, lose needles fast, become a fire hazard. My uncle up north wrote me I could cut all the trees I wanted off his land. So I had this brain wave to earn the rest of the dough I need for the spring term.

"I took orders for fresh trees, to be delivered by Santa Claus himself, at 12 bucks apiece. They're good trees, but the Santa Claus bit is part of the deal. I have to deliver 30 trees in one day, wearing an overstuffed costume and ho-ho-hoing with the kids. But I figured I could make it—until this happened."

The car slewed on an icy patch. Gus straightened it, an eye on the Pontiac behind.

"There's the pickup," said Collins.

A phantom outline, it was piled high with trees overhanging the tailgate and capped with white. Gus stopped ahead of it. The Pontiac crunched to a stop behind.

Carrying the tool kit he always kept in his car, Gus followed Collins to the pickup —a '61 Chevy with a landscape gardener's sign on its side. The girl joined them.

"It ran fine going north, and most of the way back," the young man said. "This afternoon it coughed a couple of times, but kept going. I was really rolling on this road when I hit a rough spot. A bit later the engine quit as if I'd turned it off.

"I coasted over here. The way it stopped, I thought I'd find a loose ignition wire. But nothing was loose. Then I took off the distributor cap. The points seemed

Continued

Urheberrechtlich geschütztes Material

Blast off in a Bronco!

NEW 4-WHEEL DRIVE—Bronco adds excitement to the going, wherever you go: through the woods for hunting, up to streamside for fishing, through snow, over beaches. Lots of oomph from a smooth six-cylinder powerplant and 4-wheel traction make it possible. Transmission is fully synchronized; you can downshift without stopping. Mono-Beam suspension with big radius rods makes coil springs practical: result—Bronco rides smoothly as a sedan. But how many sedans turn in a 34-foot circle? Or boast a protected underside? Try the Roadster, Wagon, or Sports Utility for a special kind of driving *fun*—on or off the road. At your Ford dealer's.

New fun one from **Ford**

Urheberrechtlich geschütztes Material

Introducing the tuned car. 1966 Buick.

What makes a car a car is styling, performance, ride and handling. Only when they're all tuned together is the car a Buick. Like this '66 Skylark Gran Sport.

You know how well your car's engine runs after a tuneup? Buick tuning has the same effect on the whole car. Not just the engine. The whole Buick. Everything blends with everything else. Styling. Performance. Ride. Handling. All tuned to work together in harmony. That's what the tuned car is. A Buick.

Everything on every Buick is tuned and balanced—and then tuned and balanced to everything else. The result is a taut, finely honed piece of road machinery. The suspension is soft enough to make you wonder how come you can barely feel the bumps you can so plainly see. But firm enough to keep you from feeling you're driving a feather bed. The steering is sensitive enough for easy handling, but not to the point of twitchiness.

Everything gets tuned. We fit Buick pistons to Buick cylinders individually. We test Buick brakes in the West Virginia mountains and then take them down to New Orleans to see what happens to them in high humidity. We even die-cast our grilles.

Why do we go to all this trouble? Because Buick buyers are among the toughest to please you can find. They don't settle for less than the best. We keep ahead of them by being even tougher to please.

All cars are tested. But. We test our cars on test tracks, yes. But we *drive* the cars to the test tracks. On ordinary roads. Wherever there's a road that can teach us something, we go to learn. And you end up with a car that can handle any road you put it on. You end up with the tuned car.

You choose: Skylark or Skylark Gran Sport. The Skylark Gran Sport you see here comes to you with a 325-horsepower Wildcat V-8 and a chassis designed especially for its capabilities.

But if the Skylark or Skylark GS don't quite fit you, you can have twenty or so other 1966 Buicks to choose from. Which leads to a happy conclusion: you get to tune the tuned car to yourself.

Wouldn't you really rather have a Buick?

BUICK MOTOR DIVISION

Urheberrechtlich geschütztes Material

okay and the cap isn't cracked. I didn't know anything else to try, so I walked to that phone in Burnly."

Gus made sure the distributor cap was on right and checked the ignition wiring. The carburetor was cleaner than the rest of the engine, probably a rebuild. After seeing that the automatic choke was closed, Gus pulled off a plug cable and held its end near the engine block.

"Give it a try," he told Collins.

The starter turned sluggishly. There wasn't a pop in response, although a fairly good spark jumped from the disconnected cable. Gus signaled Collins to stop. Selecting a wrench from his kit, he loosened the fuel line at the carburetor end.

"Crank it just a second," he called.

As Collins did so, gas spurted from the open line. Gas, air, and a spark in the cylinders should add up to at least a pop or two, thought Gus. Even a dirty air cleaner would pass some air. All the plugs couldn't have fouled at the same instant.

With numbed fingers, Gus detached the air cleaner. Shining the flashlight into the carburetor throat, he yanked the throttle open by hand. Not even a smell of gas squirted in from the accelerating pump. Next he removed some of the linkage. After taking out the bolts that held it, he carefully lifted off the air horn that formed the cover of the carburetor.

The float bowl was as dry as a temperance meeting.

Gus carried the air horn, with its pendant float, to his car and plugged in a trouble light at the dash. The two others followed him.

Wiping snow from his eyes, Gus looked closely at the needle valve—and saw something else.

"Whoever rebuilt this carburetor," he said, "forgot to tighten the float-valve seat. It slowly unscrewed, until tonight—maybe on a bumpy stretch—it came right down on the needle valve. Even with the float down and calling for gas, that cut off all fuel, so the engine quit."

"Can you fix it?" asked Collins tensely. "It's coming down harder, and with fresh snow over the old, no car's going to pull or push this loaded truck."

"Let's see," said Gus. Working over the car seat, he pulled out the pivot pin, dropped out the float and valve, and carefully tightened the valve seat into its proper position. Having worked on this model frequently, he was able to estimate float-level and float-drop adjustments fairly well by eye. He took the air horn back to the pickup and reassembled the carburetor.

"Now try it," he said to Collins.

The starter groaned, slowing a little on each turn. When it seemed about to quit, Collins turned the key off.

"I'll kill the battery for sure!"

"You had to fill the carburetor," said Gus. "Next turn may do it."

Again Collins turned the key. Reluctantly the engine churned over—and fired.

A great grin spread over Collins' face.

"You did it! We're going to make it, Betty—and just when I thought those trees were going to stay and take root."

"Snow's getting deep," warned Gus. "Better get moving right away."

Collins got out and pumped Gus's hand. "Nothing will stop us now. Hey, I know you! I've seen you around town. Heard about you, too. You're Gus Wilson of the Model Garage."

"That's me."

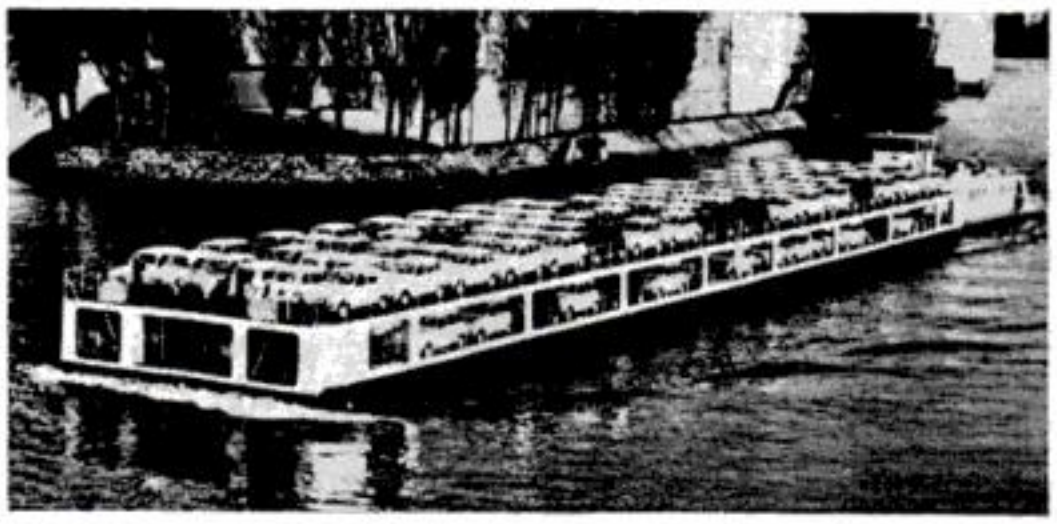
"Betty, you sure flagged the right man. That's two rescues we owe you, Mr. Wilson. With these trees practically sold, I can pay up—and gladly."

"No you don't," said Gus. "Who ever heard of charging Santa Claus?" PS

Giant barge delivers new cars

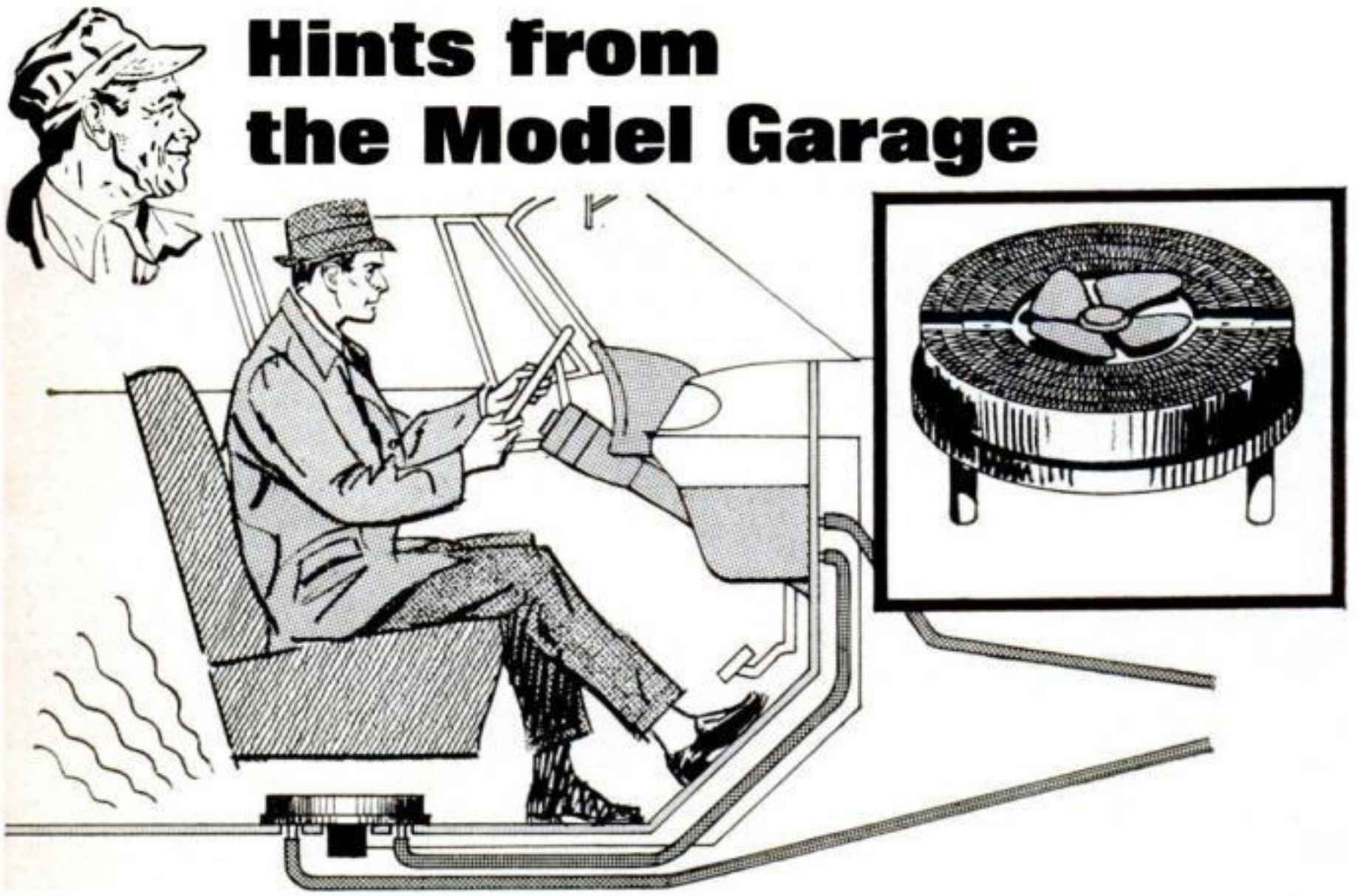
Triple-deck barges for 260 cars ferry new Renaults from the Paris factory down the Seine to a dispatch area away from heavy traffic.

Cars are driven onto two upper decks and down ramps to the hold. The craft are pushed by tugs equipped with radar, radio telephone, and powerful searchlights for night and all-weather travel.

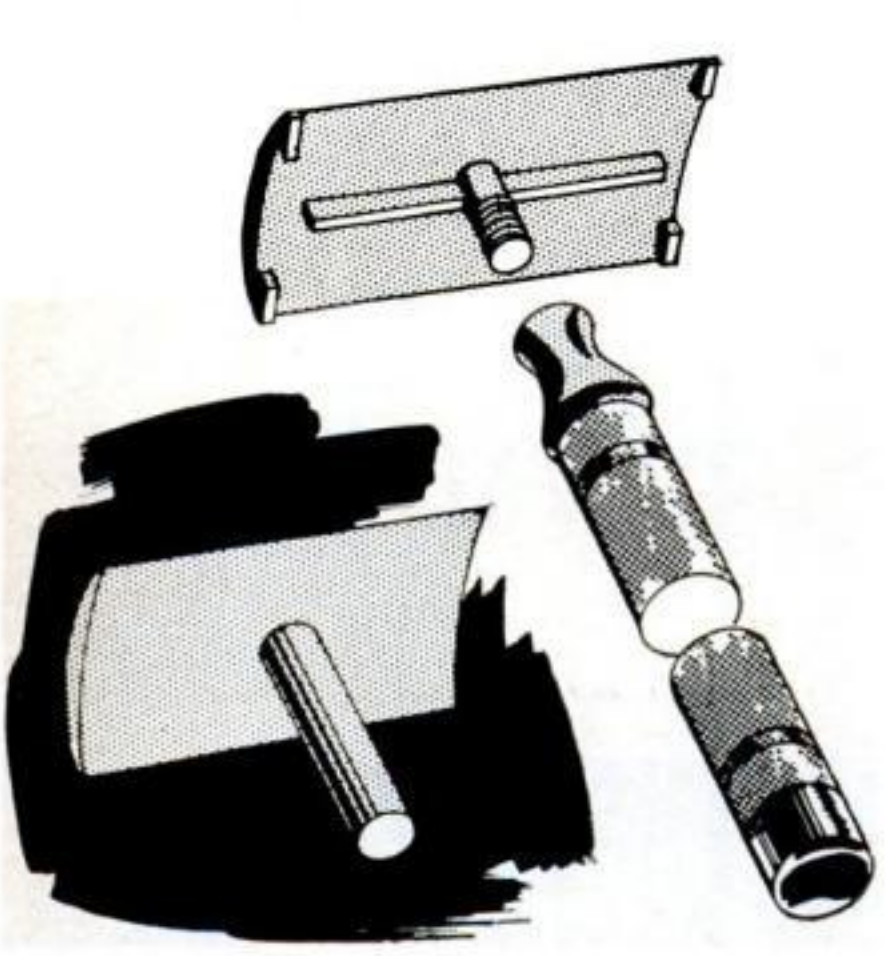


Urheberrechtlich geschütztes Material

Hints from the Model Garage



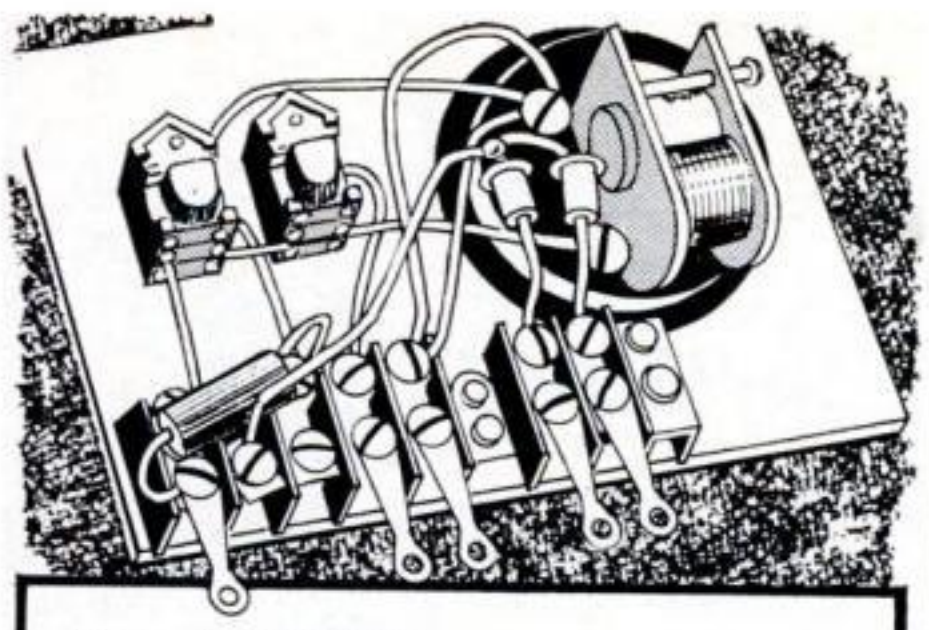
A common fault of under-dash heaters is the lack of heat for rear-seat passengers. Solution: Install an under-seat heater (from any 1948-1955 General Motors car) under the front seat, discard the heater cover, and cut holes in the floor for the fan motor and hose connections. Run a hose from the dash heater outlet to the under-seat heater's intake and a return hose from the heater to the engine. Run a wire from the fan motor to a rheostat switch on the dash and then to a hot terminal. The car's original heater control now operates both heaters.



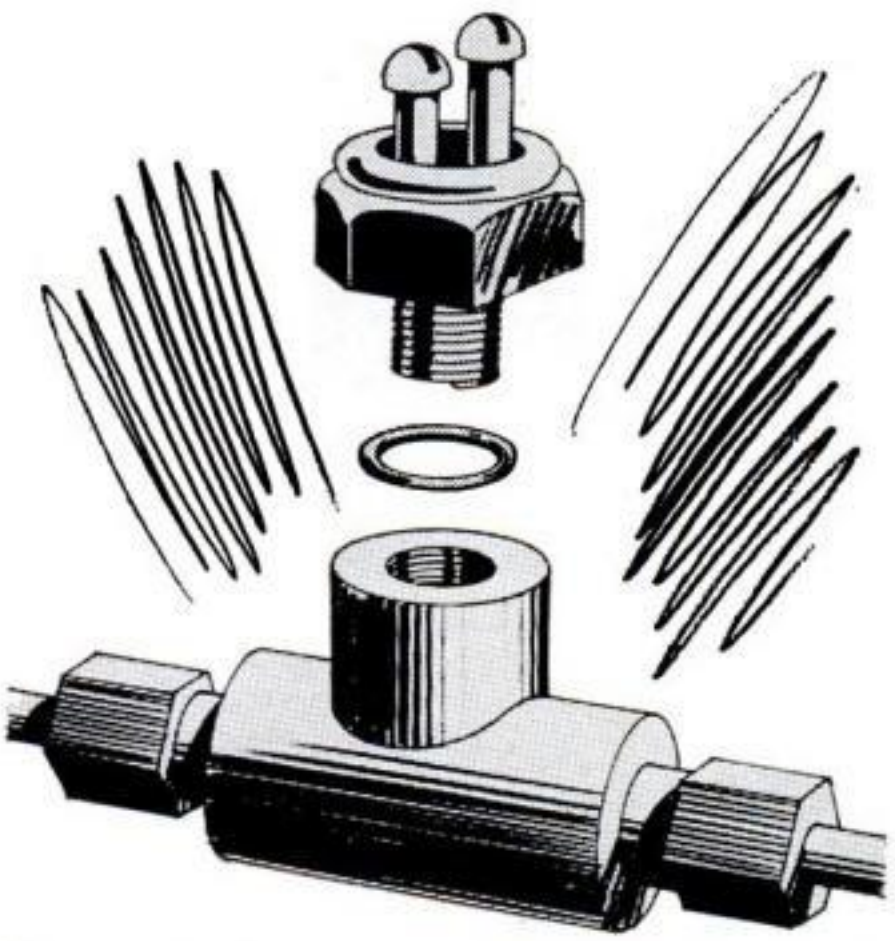
To remove upper halves of main bearings, improvise a tool from an old safety razor. Discard the backing plate and grind away all projections on the faceplate. Cut the handle in two. Turn down the top half in a lathe until it fits the journal's oil hole; then screw it back on (left).

To store spare valves so they won't stray or get damaged, carry them in a container that's also a tool for removing and replacing tire-valve cores. Solder a valve cap on a short piece of ⅜" brass or copper tubing. Close the other end with a tight-fitting plastic cap.

Urheberrechtlich geschütztes Material



To avoid leaving headlights on after you've parked your car, make this simple audio alarm. It sounds off when the ignition is turned off and the door opens—*if* the headlights are on. K1 and K2 are 15-VDC war-surplus relays; CR1 and CR2 are silicon diodes with a 500 ma. rating.

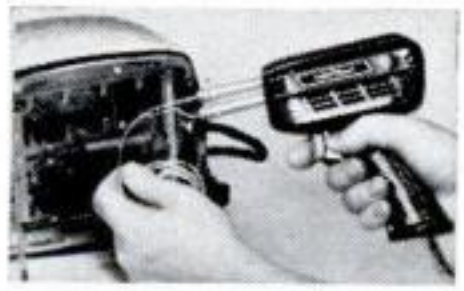


When replacing a stoplight switch that's defective, you may find the threaded hole in the T union so stretched that the new switch won't fit tight enough, causing a brake-fluid leak. Slip a spark-plug ring over the end of the new switch and you have a leakproof joint.

Continued

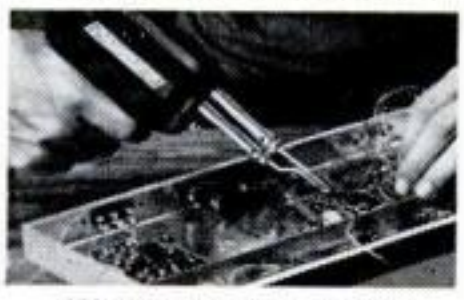
The most useful gift you can give or receive

Weller® DUAL HEAT
SOLDERING GUN KIT



ELECTRICAL REPAIRS

METAL MENDING



HI-FI KIT BUILDING

HOBBIES AND CRAFTS

Be sure it's a Weller. More Weller soldering guns are sold than all other makes combined. Unmatched for value, features and performance.

Heats fastest. Reaches full soldering temperature faster than any other soldering gun. No waiting.

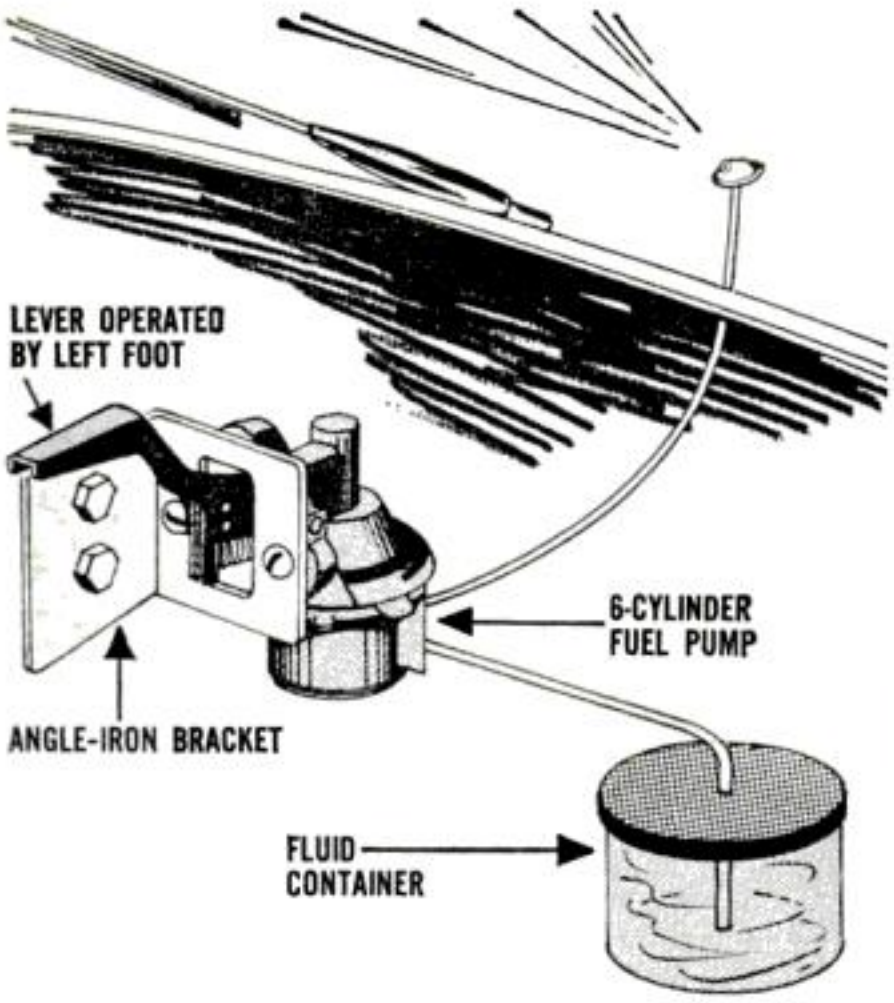
Trigger-controlled dual heat. A Weller exclusive. Two trigger positions let you switch instantly to high or low heat to suit the job.

Kit includes: Weller 100/140 watt dual heat gun, 3 soldering tips, tip-changing wrench, flux brush, soldering aid, solder, break-proof plastic case. Model 8200PK. **$8.95** list

WELLER ELECTRIC CORP., Easton, Pa.
WORLD LEADER IN SOLDERING TECHNOLOGY

Urheberrechtlich geschütztes Material

More Hints from the Model Garage



Make your own windshield washer by mounting a fluid container on the firewall or on the engine-compartment sheet metal. Run a pipe to a six-cylinder-Ford fuel pump fastened with an angle bracket to the left side of the cowl. Add a foot lever and run tubing to the nozzles.

Your Auto Hint Can Win a $15 Prize

Have you found an easier way to do a difficult job on your car? Have you worked out a short cut that is saving you money on repairs? Have you discovered a way to improve the family car at little cost? Have you devised ways to make your driving safer, to add to your driving comfort or convenience, or to change some feature or detail you disliked about your car?

If you have come up with any good ideas along these lines, we would like to know about it. We want new ideas and offer a prize of $15 for each one we publish.

Send us a complete description of your hint—typewritten if possible—and include a rough pencil drawing and/or a photograph if you feel that this will make it more easily understood. Address your entry to:

Model Garage Editor
POPULAR SCIENCE MONTHLY
353 Lexington Ave.
New York, N.Y. 10017

Brunswick

THE NO. 1 NAME IN BILLIARDS

see BRUNSWICK Home Tables

at these fine dealers

CONNECTICUT
BRIDGEPORT
Carroll Sales Co.
T. Cappy & Son, Inc.
DARIEN
Darien Sport Shop, Inc.
EAST NORWALK
Mola Bros.
HARTFORD
Alling Sportshops (All Stores)
STAMFORD
Suburban Sportsman

DELAWARE
WILMINGTON
Huber & Co.
Herman C. Matthes, Jr.

DISTRICT OF COLUMBIA
WASHINGTON
Conn. Billiard & Bowling Supply Co.
Giant Foods
Hoke Coin Machine Service

MARYLAND
BALTIMORE
Al's Billiard Supply Co.
The Hecht Co.
Levenson & Klein
Triangle Sporting Goods
BLADENSBURG
ABC Billiard Supply Co.
LANDOVER
Giant Foods
TIMONIUM
Jam Cagle's Cue Club

MASSACHUSETTS
AYER
L. Grossman & Sons
BILLERICA
L. Grossman & Sons
BRAINTREE
L. Grossman & Sons
FALMOUTH
L. Grossman & Sons
FITCHBURG
L. Grossman & Sons
FOXBORO
L. Grossman & Sons
FRAMINGHAM
L. Grossman & Sons
HYANNIS
L. Grossman & Sons
INDIAN ORCHARD
L. Grossman & Sons
IPSWICH
L. Grossman & Sons
LYNN
Lynnway Bowling and Billiard Supplies
MALDEN
L. Grossman & Sons
MARSHFIELD
L. Grossman & Sons
NEW BEDFORD
L. Grossman & Sons
NORTH CHELMSFORD
L. Grossman & Sons
QUINCY
L. Grossman & Sons
STOUGHTON
L. Grossman & Sons
TAUNTON
L. Grossman & Sons
WAREHAM
L. Grossman & Sons
WELLESLEY
L. Grossman & Sons
WEST SPRINGFIELD
L. Grossman & Sons
WHITMAN
L. Grossman & Sons

NEW HAMPSHIRE
PORTSMOUTH
L. Grossman & Sons
SALEM DEPOT
L. Grossman & Sons

NEW JERSEY
NEW JERSEY
Bambergers (All Stores)
R & S Stores (All Stores)
DOVER
Dover Sports Center
ELIZABETH
Custom Billiard Supplies
Kolkers Toys
GREENBROOK
Tiny Tots, Inc.
LINDEN
Kiddy Mart
LONG BRANCH
Perrys Bowling & Billiard Supply
NEW BRUNSWICK
Meyer's Discount Mart
NEWARK
Krupps Toy Shops
RAHWAY
Amorelli's Sport Shop
SOMERVILLE
Muller & Cashin Sporting Goods
TEANECK
Davis Toyland, Inc.
TRENTON
Pearl Vending Service, Inc.

NEW YORK
BETHPAGE, L.I.
Gerry Meyers Long Island Swimming Pool Svc. Co.
BROOKLYN
Abraham & Straus, Inc.
Banner Lumber Co.
BUFFALO
Sciandra's Billiard Supplies
CHEEKTOWAGA
Frank P. Kick Athletic Goods
HICKSVILLE
Futura of L.I., Inc.
HUNTINGTON, L.I.
Harrows
KEW GARDENS, L.I.
Kew Gardens Sport Shop
MOUNT KISCO
Playmates of Mt. Kisco
NASSAU
Abraham & Straus, Inc.
B. Gertz, Inc.
NEW YORK
Abraham & Straus, Inc.
B. Gertz, Inc.
V. Loria & Sons Bowling & Billiard Supply & Equip.
PATCHOGUE, L.I.
Mid Island Billiard Table & Supply Co.
PORT CHESTER
Nu-Clear Pool Svc., Inc.
POUGHKEEPSIE
Poughkeepsie Billiard Supply
QUEENS
Abraham & Straus, Inc.
B. Gertz, Inc.
ROCHESTER
Pro Billiards
Schoenheit Supplies
Tent City
ROCKVILLE CENTER
Porch & Patio, Inc.
SCARSDALE
The Sport Stop, Inc.
SEAFORD, L.I.
Brothers Three, Inc.
STATEN ISLAND
K. A. Industries

PENNSYLVANIA
ALLENTOWN
Gebhardt Bowling Supply Co.
CHESTER
L & H Sporting Goods
PHILADELPHIA
Active Amusement Machine Co.
Gimbles
M & H Sporting Goods
Strawbridge & Clothier
PITTSBURGH
Joseph Horne Co.
Kaufman's
UPPER DARBY
Brooks Sporting Goods

RHODE ISLAND
NORTH KINGSTOWN
L. Grossman & Sons
WOONSOCKET
L. Grossman & Sons

VERMONT
BRATTLEBORO
L. Grossman & Sons

and at other billiard table dealers and department stores in your area

BRUNSWICK CORPORATION

Urheberrechtlich geschütztes Material

Edgebrook VII, $275;

imagine!

you can own a Brunswick home billiard table for only $275

Interested in a home billiard table? Wonder what's meant when they're advertised as "professional quality"? Well, Brunswick's the world's largest and oldest manufacturer of commercial billiard tables. There are more Brunswick tables in professional use than any other. It stands to reason then, that "professional quality" really means Brunswick quality.

So, why buy an imitation when you can have the real thing!

You can choose a Brunswick billiard table from 8 apartment and home weight models. Prices start at $275. (If you're a real pro you'll want to see the Squire IX at $1095.) But, whichever model fits your purse (and your room), it will give you longer years of better play. More fun, too. Choose from Honeycomb up to five inches thick, PERMALEVEL or LEVELITE® . . . warranted exclusive table beds featuring rigid portability, and a host of other Brunswick features are built-in for professional playability.

So see the real thing . . . see Brunswick home tables at the nearest sporting goods or department store.

ALSO AVAILABLE:
Edgebrook VIII, $285
Executive VII, $365 • Executive VIII, $395
Celebrity, $495 • Monarch, $595.
Squire VIII, $995 • Squire IX, $1095.

Brunswick
THE NO. 1 NAME IN BILLIARDS

"I'm interested in a Brunswick home table; please furnish more details."

Brunswick Corporation
Department P
Billiards Division, Adv. Mgr.
623 S. Wabash Ave. • Chicago, Ill. 60606

Name _____

Address _____

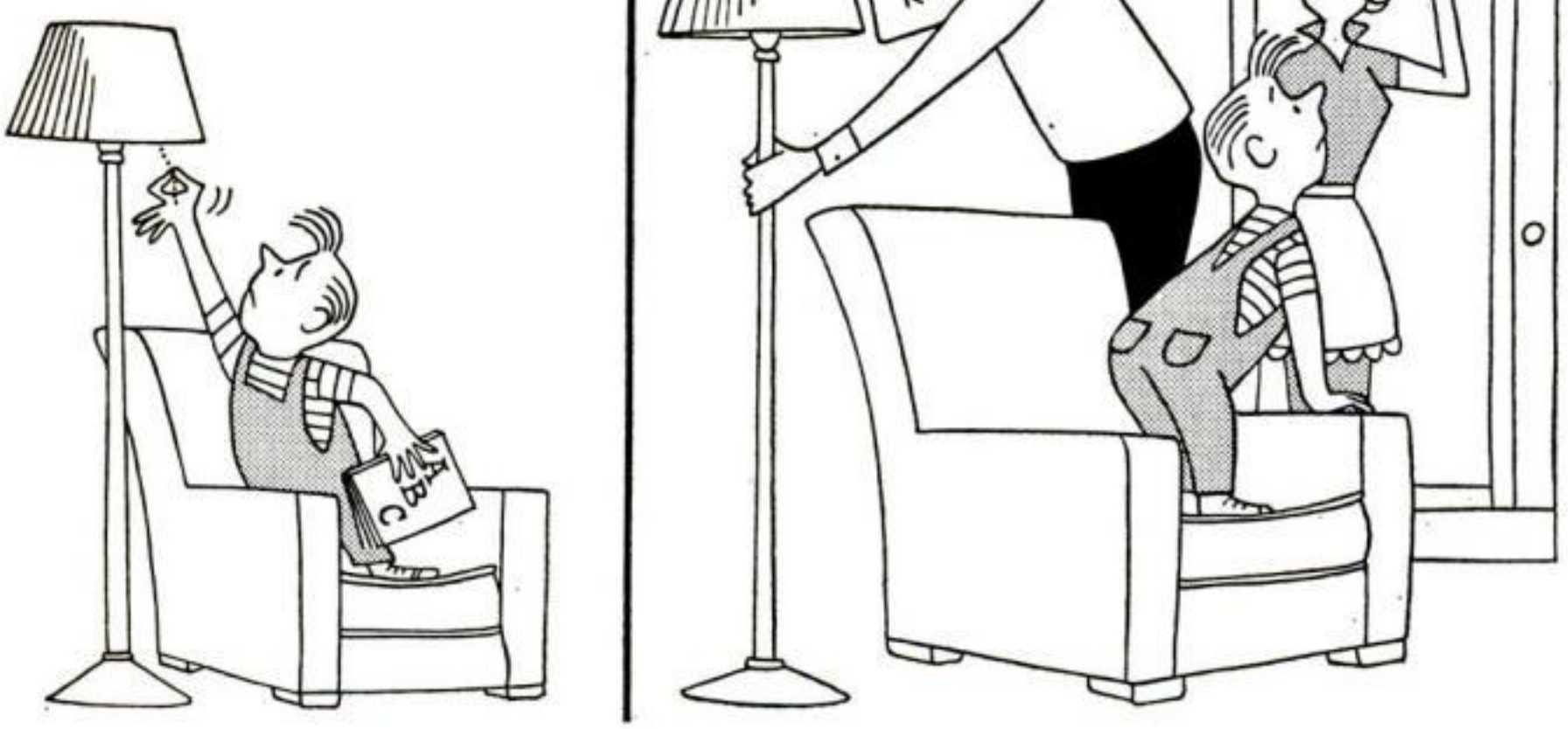
Phone No. _____

City _____ State _____ Zip Code _____

Urheberrechtlich geschütztes Material

Wordless Workshop

By ROY DOTY



It's just like having TEN

STANLEY QUICK-POINT KNIVES

These amazing new break-away blades are found only in the NEW STANLEY QUICK-POINT KNIFE (No. 09). Ideal for scoring and general cutting. Quick, safe push button advances new ten-point break-away blade. You simply snap off old point, and have new point instantly. You can *change* blades, *store* blades without taking knife apart!

Urheberrechtlich geschütztes Material

Continued

sharp knives on hand. Why?

Because there are ten sharp points per blade

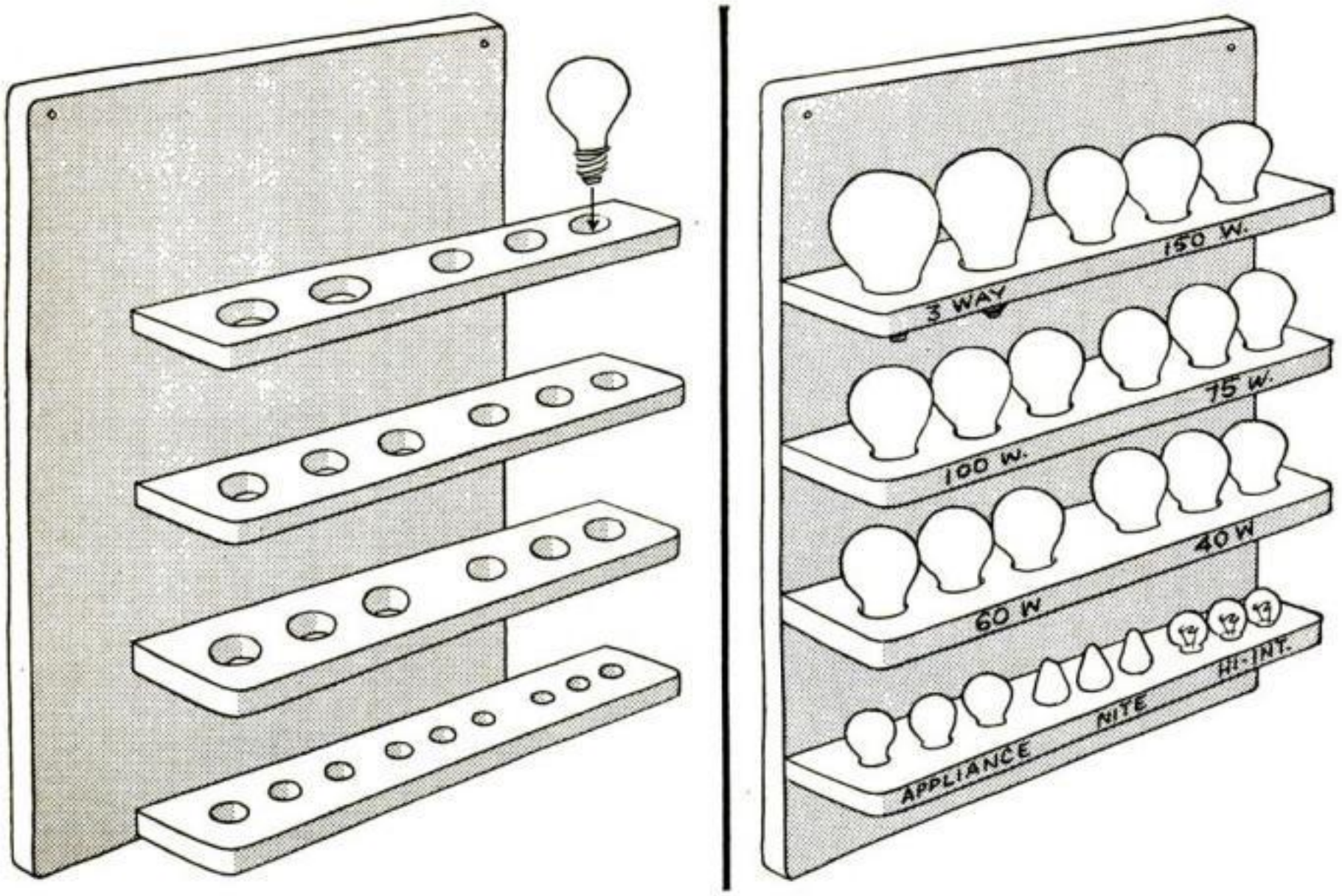
Two ten-point break-away blades are provided with this quality Stanley Tool . . . *plus bonus blades* . . . two double-pointed reversible utility blades for heavy duty cutting all stored in magazine handle. Comfortable contoured handle is aluminum for light weight and high strength. Stanley Tools, Division of The Stanley Works, New Britain, Connecticut. Sold practically everywhere.

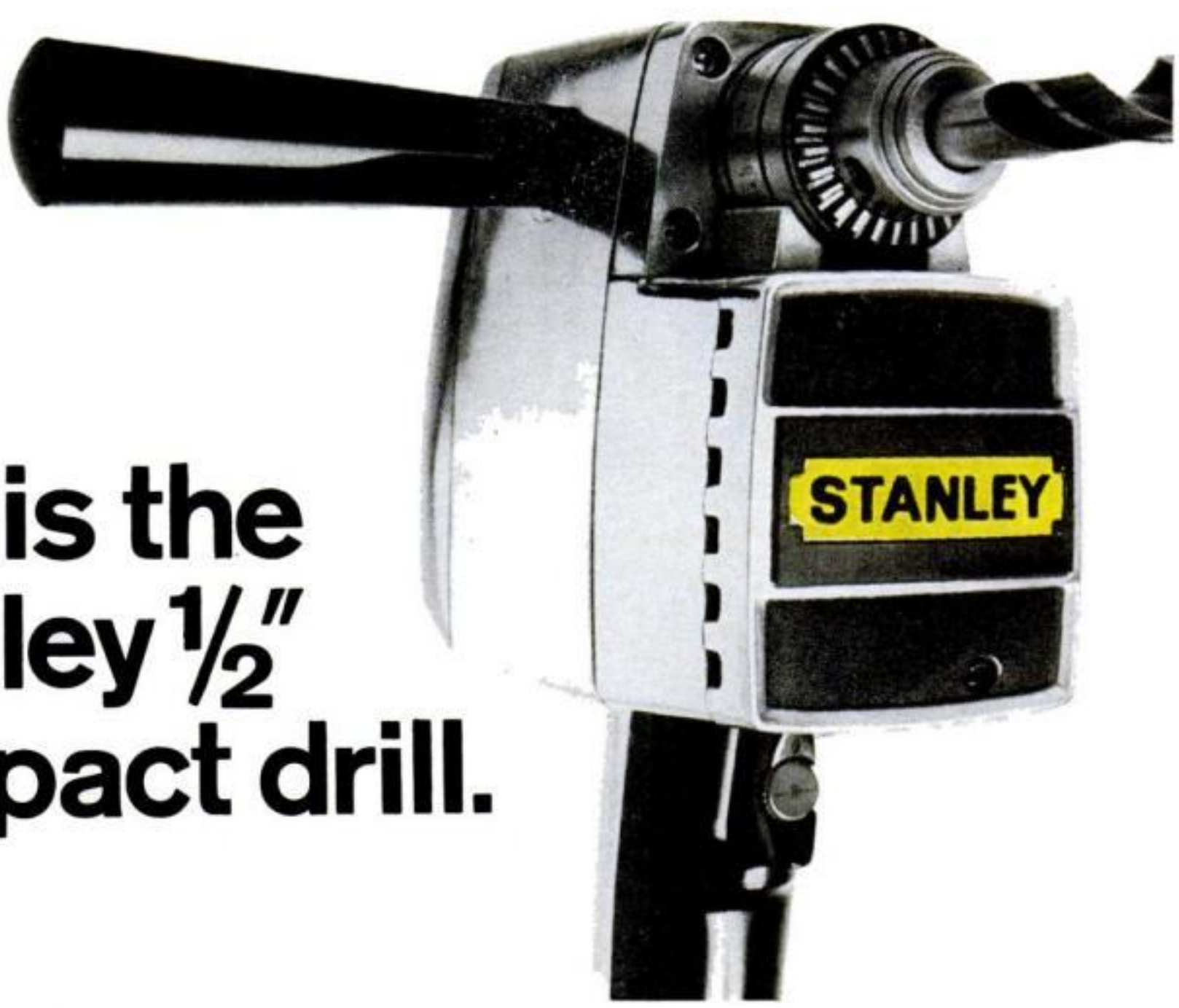
STANLEY®

THE TOOL BOX OF THE WORLD

Urheberrechtlich geschütztes Material

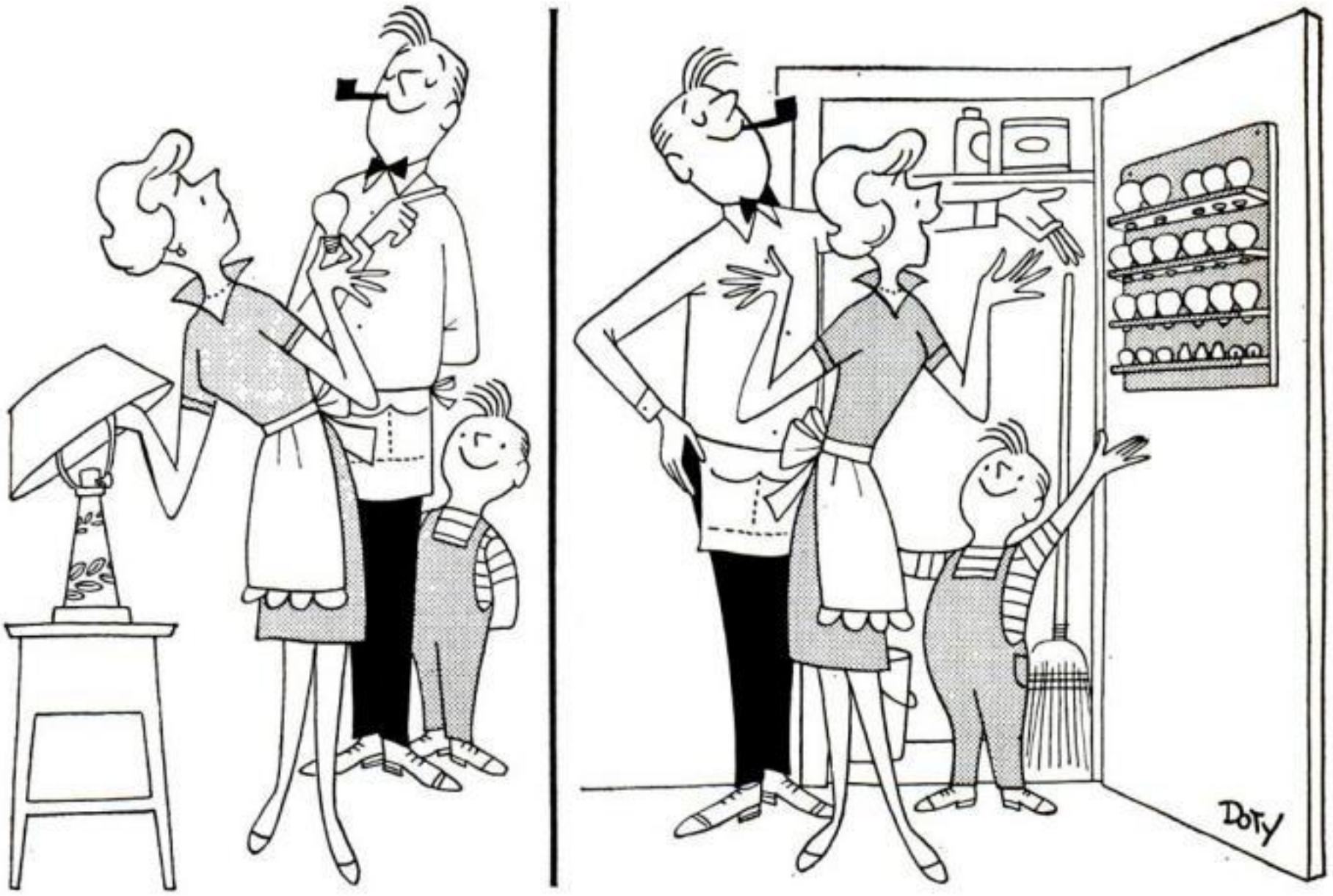
WORDLESS WORKSHOP continued





This is the Stanley ½" compact drill.

Urheberrechtlich geschütztes Material



Even the name works.

The name is a rubber bumper, so you'll never mar your work. But that's the least of it. The important news is the amount of power that Stanley has packed into such a compact size. Here's 3/10 H.P. in a shape that lets you handle the toughest jobs in the tightest corners. Here's light-weight heavy duty construction for effortless handling. A burn-out protected motor. Perfect leverage and torque control. Long life precision-cut steel gears. Here's power to pierce a half inch of steel. Use red button for reverse action to back out of tough jobs. See the Stanley ½" all-purpose drill at hardware stores or lumber yards that take their tools seriously.

STANLEY...for people who take their work seriously

Urheberrechtlich geschütztes Material

This book doubles your home shop pleasure... helps get things done faster, better!

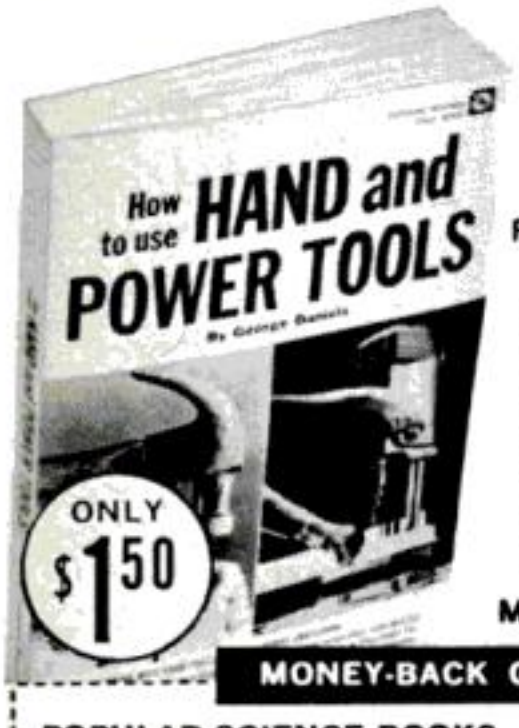
Published especially for Popular Science readers

Quick, easy and fun—that's what your shop work will be with this helpful book to speed you along. HOW TO USE HAND AND POWER TOOLS by George Daniels gives complete, clear, word-and-picture info on using *all* important home workshop tools.

Hand tool section includes • saws • planes • hand drills • hammers • chisels • files and rasps • screwdrivers • rules • squares • dividers • gauges • abrasives • clamps • glues.

Power tool section includes • portable drills • cut-off saws • radial arm saws • routers • table saws • sabre saws • portable sanders • drill presses • lathes.

You'll have at your fingertips 1001 time-and-money-saving tips, including many *new* uses for your tools. Discover a foolproof way to hinge doors perfectly with a sabre saw. Learn what hidden quality features to look for when you buy power tools. Much, *much* more. Extra section on how to plan your own power tool shop. Yes, you'll turn 'em out like a pro with this fact-filled Skill Book in your workshop. Over 325 illustrations. Bound in durable hard-gloss paper.



This is a POPULAR SCIENCE SKILL BOOK

★ Complete
★ Authoritative
★ Fact-filled
★ Easy to follow
★ Fully illustrated
★ Inexpensive

From the publishers of Popular Science Monthly

MAIL COUPON NOW

MONEY-BACK GUARANTEE

P178

POPULAR SCIENCE BOOKS
355 Lexington Ave., N.Y.C. 10017

Rush my copy of HOW TO USE HAND AND POWER TOOLS postpaid. I enclose $1.50 in full payment.

Name_____

Address_____

City_____ State_____ Zip Code_____

Money back in 10 days if not completely satisfied.

How They Make a Typewriter Talk

[*Continued from page 112*]

how to operate, and eight sound tracks. Two magnetic pickup heads on worm gears reproduce the teacher's instructions and his voice and feed them to appropriate parts of the machine. The "programed" card is inserted in a slot in the top.

The programing card with the pickup head for "reading" it, and the circuitry for translating and feeding data to the machine, actually form a digital computer—literally the "brains" of the robot teacher. A six-bit binary code is used to unblock any of the 52 typewriter keys for letters, numbers, or punctuation marks, to allow the upper-case, lower-case, back-space, or tab levers to be operated, and to return the typewriter carriage at line's end.

The same code is used to direct the built-in slide projector to turn on and off, to go forward or back in its slide file, or to hold. The computer also directs the red pointer, and sets the machine so the student can record his own voice—especially useful in teaching foreign languages.

Disciplinarian, too! The typewriter of this first teaching robot is jamproof, and all of the keys remain blocked after one has been pressed to prevent audio mix-up and discourage wild typing by enthusiastic youngsters. Even the varicolored keys have a purpose—paint a child's fingers with corresponding colors and he automatically learns touch typing.

A built-in encode mechanism, hidden under a locked panel in the front of the machine, lets the teacher program a card merely by pressing buttons and speaking into the mike built into the speaker grille.

An intercom panel, cable-connected to the robot, permits the child to tell the teacher when he's finished. Timers built into this remote panel show how long a youngster takes to respond to the command to press a key, and how long he uses the machine.

While every E.R.E to date has been fabricated by hand at a cost of about $30,000, volume production is expected to cut down this figure to make the robot a fixture in grade schools across the country.

One fact is certain: These "teachers" are bound to be popular. At schools where they have been tested over long periods, youngsters exposed to them readily regard them as "friends"—some have even confided secrets to them! PS

DANA ANDREWS, Star of Stage, Screen and TV. . . Reports on AMERICA'S MOST REMARKABLE BUY IN PROFESSIONAL QUALITY POWER TOOLS...

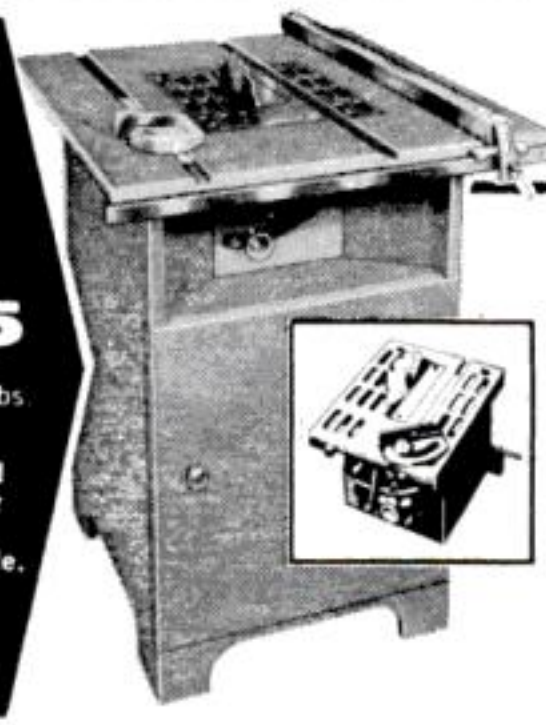
DANA ANDREWS . . . Star of "CRACK IN THE WORLD" in Technicolor—a Paramount Release—writes . . . "Like most people, I guess, I sure had my doubts about how anyone could sell machines that are supposed to do so much . . . for so very little. I was never more pleasantly surprised! Every claim for them—and more—is true. Putting them through the most rugged workouts, has convinced me that the AMCO people know something no other manufacturer in America has been able to find out. These machines are, without question, a most remarkable buy in professional quality power tools."

BUY DIRECT FROM OUR FACTORY **Amco POWER TOOLS** SAVE AS MUCH AS **80%**

8" TILT ARBOR POWER SAW $14.95

f.o.b. factory. Wt. 25 lbs.

Includes completely assembled cast iron and steel 8" tilt arbor power saw with ground cast iron table . . . less blade. If desired, RIP FENCE for easier work alignment, $3.50 additional



REVOLUTIONARY PATENTS DECREASE COSTS, INCREASE EFFICIENCY Full scale power tools of heavy duty 100% cast iron and steel. Streamlined design reduces weight, cuts material and production costs. Special patents provide added efficiency, accuracy, savings. Parts made, assembled, tested and packed right in our own factories, shipped direct . . . save store profits.

DOES WORK OF $75 BENCH SAW as is. Converts easily to equal any $300 floor model cabinet units! Crosscuts, rips, mitres, cuts compound angles, dadoes, makes coves and mouldings.

FREE CABINET BASE PLANS Use as portable bench saw as received (inset photo) . . . or transform easily and inexpensively into floor model (as shown) guar. to do work of floor models costing $300. FREE plans . . . sheet of ¾" plywood and 3-4 hours are all you'll need. Use your AMCO saw for cutting. Plans provide 27" x 24" work surface, 33" height, pullout sawdust bin, tool storage compartment.

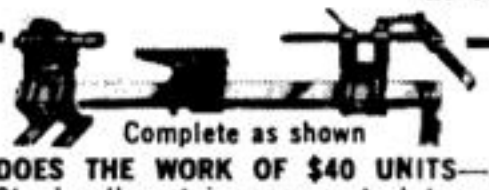
10-YEAR FULL SERVICE GUARANTEE*

BLADE TILTS . . . TABLE STAYS LEVEL • Locks securely at any angle to 50°, raises, lowers 0"-2¼" • Patented tilt mechanism, accurate etched scale • Patented motor mount takes std. ¼ h.p. or larger motor, keeps belt tight, assures perfect alignment at any angle, transmits full power • Takes std. blade, saw insert removes to take dadoe heads, cutters, etc. (not incl.) • Accurate mitre gauge assembly • Ground spindle • Enclosed steel base • "Compo" bearings • Accessories available at factory prices • RIP FENCE, if desired for easier work alignment: Std. size (for bench saw) $3.50; larger fence (for cabinet base, as ill'd.) $4.50.

6" SWING 3-FT. LATHE $9.85

f.o.b. factory

Optional Faceplate for turning bowls, trays, lamp bases, rosettes, etc. $2.50



Complete as shown

DOES THE WORK OF $40 UNITS— Sturdy all cast iron power tool turns wood or plastics with the precision and speed of machines selling for 4 times as much. Tubular steel bed, ball thrust cup center, spur center, T-Rest assembly, lever action tail stock. 2 speed pulley. Fits any motor.

10-YEAR FULL SERVICE GUARANTEE *

FULL 22" LONG, 4⅛" JOINTER-PLANER $19.95

F.O.B. Factory Complete as shown

100% precision ground cast iron and steel.

DOES WORK OF $60 UNITS Now, at little more than a hand tool price, a guaranteed professional quality precision machine which does same work as skilled hand planing . . . much faster, more accurately. Make accurate glue joints; rabetting cuts for doors, window frames, table drawers; square taper cuts for chair legs; accurate beveling.

• **Precision ground cast iron tables, adjustable for depth of cut** • **Rigid cast iron base** • **New patent-pending design holds clearance between knives and tables at any depth** • **Rabett depth ⅜"** • **Hardened, ground high speed steel knives** • **Patent-pending fence adjustable to any position, any angle 0°-50°** • **Patent pending lift-off guard (nothing to loosen!)** • **Balanced steel cutter head.**

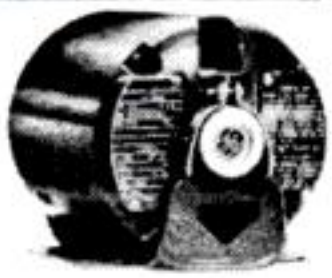
10-YEAR FULL SERVICE GUARANTEE *

UNCONDITIONAL 10-DAY MONEY BACK GUARANTEE You must be fully satisfied. If not, return in 10 days, freight collect. Money refunded in full, no questions asked.

W OR GE 1/2 HP ELECTRIC MOTOR

SPECIAL AMCO PRICE (when purchased with any unit in this ad) **$12.95** f.o.b. factory

if purchased separately, $18.95



SPECIAL LIMITED TIME ONLY Brand new factory-fresh motors for use with any of the units on this page. Limited quantity purchase . . . first come, first served. Wt.: 17 lbs.

FULL SERVICE 1-YEAR WARRANTY

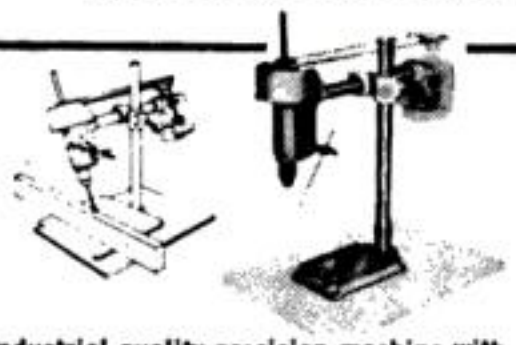
32" RADIAL DRILL PRESS $29.95

F.O.B. Factory

½" Cap. Jacob's Chuck Inc

Shipping Wt. 30 lbs.

DOES WORK OF $90 UNITS . . . AND A GREAT DEAL MORE



Industrial quality precision machine with all features of standard drill press, many extras. Head raises, lowers. Greatly increased depth of throat. Can be pre-set to any angle or position for on-or-off table drilling . . . even horizontal drilling. All cast iron and steel.

10-YEAR FULL SERVICE GUARANTEE *

***10-YEAR FULL SERVICE GUARANTEE** Any part or parts of any AMCO power tool which may become inoperative for any reason within **ten years** after the purchase date will be repaired or replaced by the factory without cost to the purchaser. Your only cost: for postage.

MAIL COUPON TODAY!

AMERICAN MACHINE & TOOL CO., Dept. PS-125, Royersford, Pa.

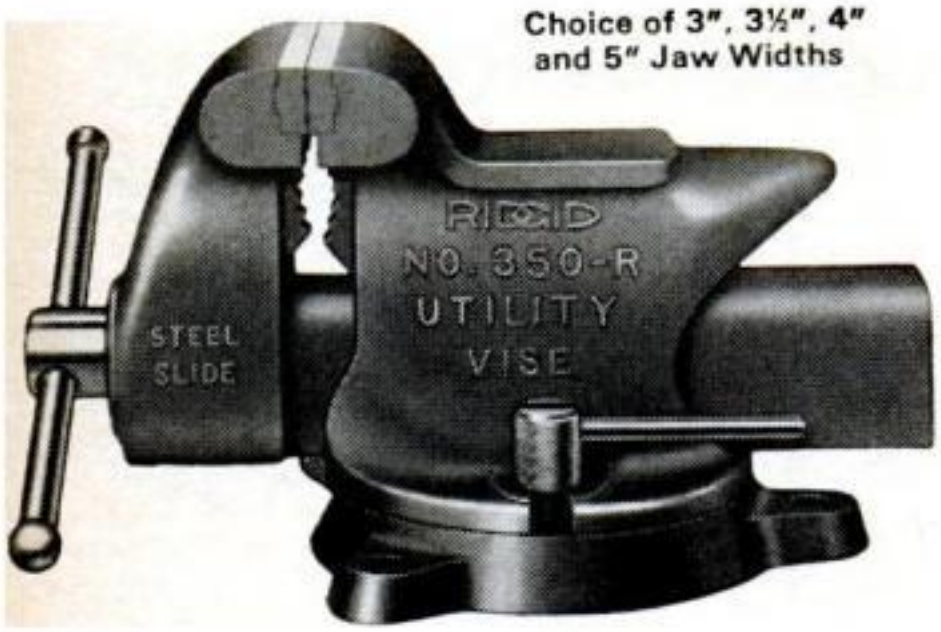
Please send me the units checked. Payment in full enclosed $..... or $3 deposit each item enclosed, balance C.O.D. ☐ I MUST BE FULLY SATISFIED OR WILL RETURN UNIT WITHIN 10 DAYS FOR FULL REFUND. No questions asked.

☐ 8" Power Saw at $14.95 ☐ Jointer-Planer at $19.95
☐ Standard Rip Fence #354 at $3.50 ☐ Lathe at $9.85
☐ Long Rip Fence #354C at $4.50 ☐ Drill Press at $29.95
1/2 hp GE Motor: ☐ $12.95 (purchased with other item) ☐ $18.95 (if purchased separately)

NAME .....
ADDRESS .....
CITY ..... ZONE/ZIP ..... STATE .....

Urheberrechtlich geschütztes Material

NEW RIDGID® UTILITY VISE
gives you 7 extra-value features



Swivel base swings full 360°. Base clamp gives solid support across full base. Clamp handle swivels on ball joint for fast adjustment. 3 jaws give slip-proof grip on pipe. Anvil surface is extra large. Large, strong slide-support-horn permits heavy-duty use. Hardened jaws are cast in place . . . can never come loose.

BUY THESE EXTRA HANDY RIDGID UTILITY VISES AT YOUR DEALER

RIDGID®

The Ridge Tool Company, Elyria, Ohio, U.S.A.

IT IS . . . a perfect heavy duty cleaner that makes wood floors and stairs look like new.

IT DOES . . . take off old varnish, shellac from wood floors without costly machine sanding. No harmful fumes . . . no fire danger . . . non-caustic or acid. Just mop on . . . mop up . . . refinish

"Where Paint is Sold"

SAVOGRAN

Addison, Ill. NORWOOD, MASS. Los Angeles, Cal.

When You Rent a Car

[Continued from page 91]

How much insurance is there? Does it apply in all states you plan to visit, or is it canceled if you cross a state line? Is it canceled if you let someone else drive? (Some policies are—even if a parking-lot attendant handles your car.)

For only $1 extra you'll be offered full coverage. Most renters give you $100-deductible damage insurance. This means you pay for any damages less than $100. But if you agree to pay $1 extra this restriction is lifted. The joker is this: The $1 is a *per diem* rate. It's charged for every day you keep the car.

Who pays for towing if you break down? Some renters do. The full-service renters and some cut-raters will often even send a new car, or a mechanic if needed. If you have to pay for repairs, get vouchers and you'll be reimbursed.

But some renters don't have this provision. You're on your own if you break down.

Before you take the car, walk around it. Look for dents, scratches. Then be sure these are clearly written into your contract in the space marked "exterior damage." Also look for seat burns. They, too, should be noted (in the "interior-damage" space) —or you may be held responsible when you bring the car back.

Next, check the odometer. Does the mileage reading correspond to the "starting mileage" as written into your contract? Also check lights, horn, wipers, radio, air conditioner (usually $1 or $2 extra per day), brakes.

When you have a chance, check the odometer by mile posts for accuracy. Some cheat by recording more miles than you drive. On a 600-mile trip I found my odometer was clocking one extra mile in every 20. Since the car belonged to a responsible agency I merely reported the error and got $3 back.

You can rent sports cars these days. For rates ranging from $13 a day plus 13 cents a mile you can rent a Corvette Sting Ray (automatic transmisson), Corvair Corsa, Mustang, Triumph TR-4, or a Volvo P-1800.

To rent a sports car, anyone over 21 proceeds as with any ordinary car. In lieu of a credit card a $50 deposit is taken.

You then get a five-minute familiarization briefing, after which one rental company issues you a membership card in a sports-car rental club. Some recent rallies

Urheberrechtlich geschütztes Material

When You Rent a Car

and races have been run with as many as three or four rented entries.

A driver under 21 fills out a special application form and parental consent is required. The parent then contracts to take the car as the prime renter, but the young applicant does the actual driving. This idea has spread to 21 cities.

Leasing. As an alternative to renting a car, you can lease one on a long-term basis. Rates and plans vary, but typically you can lease a Tempest for about $75 a month, an Impala for $85, and a Bonneville for $100.

Up to 25,000 miles all maintenance is free—but you buy the gas. In some lower-price deals only partial maintenance is included. But full maintenance may come with the Bonneville. Over 25,000 miles, you may pay an extra penny a mile.

Often leasing is done by car dealers themselves. You order your rental as you'd order a new car and even select your colors. You get a factory-new car and one new set of tires a year. You turn your car in every second year.

This idea appeals to many drivers. Can it save money for you?

In most cases, no. Leasing usually proves economical only for large companies that have fleets yet don't want to build maintenance facilities. Leasing does, however, seem to work out for some individuals:

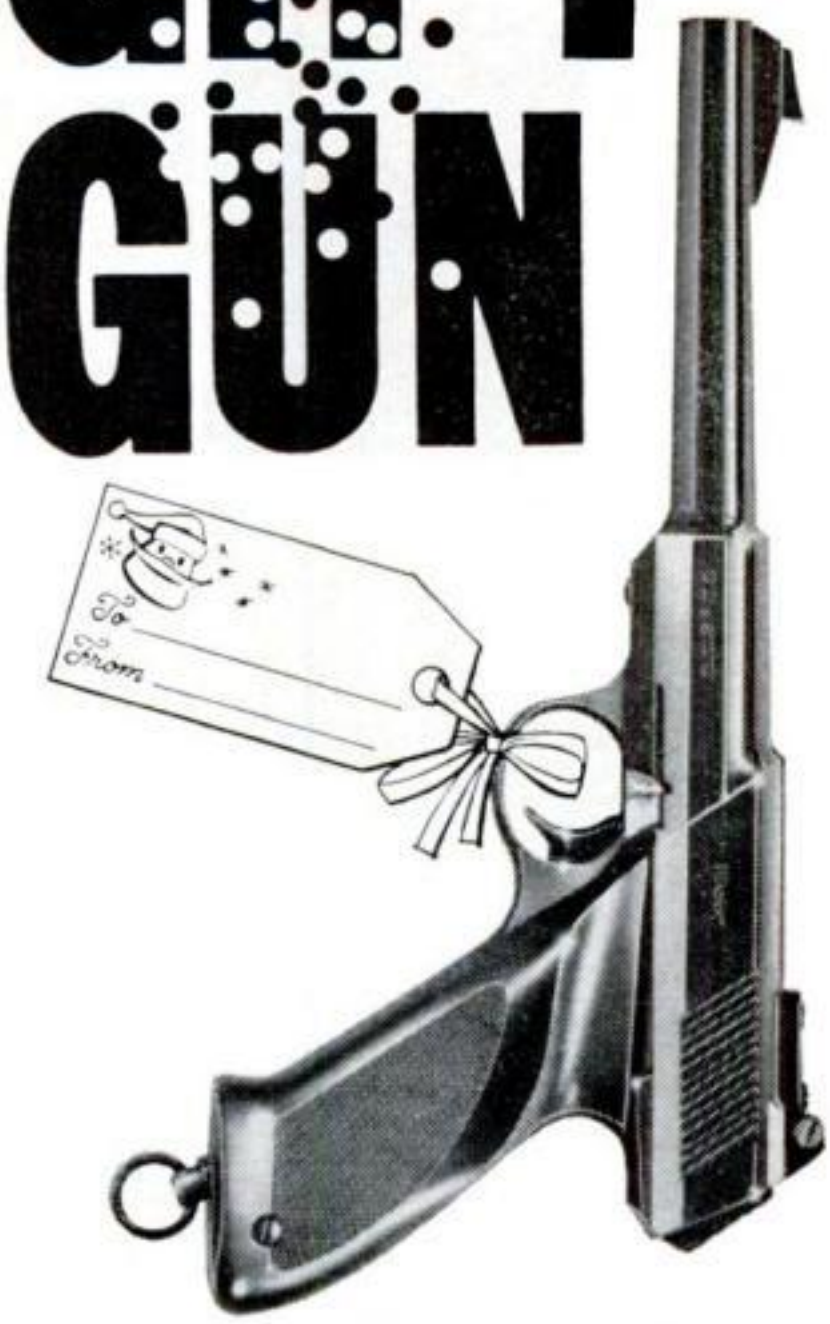
- Those who don't know anything about cars, or don't want to be bothered with maintenance and can afford to pay more.
- Those who live in big cities where parking, garage, and repair costs have gone sky-high. Leasing firms claim it costs $1,700 a year to own a car in such cities. They'll lease you one for $1,150.

But if you drive over 7,000 miles a year, they admit, it's cheaper to own.

- People who live in any average town but drive over 35,000 miles a year. This sort of driving turns cars prematurely old and repair bills run high, so leasing, even at $160 a month, seems to pay off. In two years, adding in $300 for excess mileage at one cent a mile, you pay out only $4,140, or less than you'd pay for a fully equipped Bonneville, especially if you add the heavy annual car taxes in some states.

The catch, of course, is that at the end of two years you don't own the car. But you do have the wonderful satisfaction of always driving a new—and trouble-free—automobile. PS

GIFT GUN



Some stocking stuffer! Say "Merry Christmas," with a Daisy $CO_2$200

All the heft and feel of a more-powerful handgun . . . yet plinks all day for pennies! Fires inexpensive .177 caliber B•Bs semi-automatically at 400 feet per second. Constant full power from standard or giant Jett® CO_2 cylinders (no "O" ring to leak) . . . more than 150 shots from the large size. Adjustable sights. Ideal for indoor target ranges, camping out, fishing trips. How about it, Santa? About $18.50.

Daisy®
CO_2 GUN DIVISION

For more information, see your local dealer or write DAISY MANUFACTURING COMPANY, CO_2 Division, Box 125-SI, Rogers, Ark. 72756.

Urheberrechtlich geschütztes Material

GRINDS POLISHES
DRILLS SHARPENS
CARVES DEBURRS

No. 2 Moto-Tool Kit Illustrated

MOTO-TOOL
THE POCKET SIZE MACHINE SHOP

Handiest tool you'll ever own. Does fine detail work with pin point accuracy. Eliminates time consuming hand work. Gets into places difficult to reach with larger tools. 27,000 RPM. Collet sizes 1/8", 3/32" and 1/16". An industrial favorite since 1936. Wt. 13 oz.

NO. 2 MOTO-TOOL only $19.95
NO. 2 MOTO-TOOL KIT with 23 accessories in steel case $29.95

NEW HEAVY DUTY NO. 3 MOTO-TOOL

New high torque motor designed for hard industrial use. Same features as No. 2 plus 50% increase in power.
NO. 3 MOTO-TOOL only in steel case $29.95
NO. 3 MOTO-TOOL, 23 accessories, steel case.. $37.95

SEE YOUR DEALER OR WRITE FOR CATALOG
Dremel Mfg. Co. • Dept. 125-L • Racine, Wis.

Sensational, All Purpose, New 6 in 1 EMCO-STAR

Instant Change-over

6" Band saw
8" Circular Saw
7" Disc Sander
8½" Jig Saw
2" Belt Sander
Saber Saw

Complete shop for home & industry

New EMCO-STAR is the fastest change-over machine ever. Switch from band saw to Circular saw, then to sander, instantly.

Check these exclusive EMCO-STAR features:

✓ The only combo-machine that gives you band saw and jig saw as part of the basic unit ✓ Convenient size ✓ Compact enough for portable use ✓ Ball-bearing equipped throughout ✓ Add wood lathe and molder with low cost attachment ✓ Many accessories available ✓ Precision-built by the makers of multi-purpose UNIMAT. Write for catalog: **American Edelstaal Inc.,** Dept. HE-L5, 350 Broadway, N.Y.C. 10013.

$189 complete
or
$33 down
$14.50/mo.

They're Still Inventing the Telephone

[Continued from page 96]

structs ESS to look up a stored number in its electronic memory and put a call through. While I watched, Lozorisak hit star 1; seconds later, he was talking.

Later, I tried this trick at Succasunna's telephone exchange. "Just push star 1," the manager said, handing me a phone.

An instant later I listened with amazement to a recorded weather forecast from San Francisco. In less time than it takes to tell about it, No. 1 ESS had looked up the area code and weather number for a city across the continent, selected a route, and put my call through.

Judging from the results of the Succasunna tests of ESS thus far, abbreviated dialing is here to stay: You can look forward to the day when you will dial most of your calls with three digits or less. When you order your new telephone you will give the man that installs it a list of, say, 30 phone numbers, which you will identify with your own numbers, 1 through 30. From that point on, you will simply dial 11 (or push the star button), then dial the one- or two-digit number you want.

How it works. No matter what shape your telephone takes in the years to come—Touch-Tone, Trimline, or even Picturephone—electronic switching, or ESS, will serve as your unseen genie.

As the latest step in the evolution of telephone exchanges, ESS bears little resemblance to its ancestors. The first exchanges with rows of girls pushing plugs, pulling cables, and purring sweetly into their mouthpieces were nearly gone by 1935 when the dial phone came along. But there was still a lot of activity. Automatic relays were rocking and chattering, and motor-driven switches clacked away and clambered up and down rows of contacts like monkeys on flagpoles.

By contrast, ESS seems almost lifeless. Nothing moves. When I walked into the experimental exchange at Holmdel, it was going full blast, handling 100,000 simulated calls every hour. But the place seemed like a locker room long after a ball game: long rows of silent steel cabinets and not a soul in sight. Invisible switching pulses raced at a frantic clip. Where "hello girls" once glanced along a row of lights to see which line was flashing for service, an electronic scanner now "looks" at each of 65,000 lines 10 times a second.

Urheberrechtlich geschütztes Material

They're Still Inventing the Telephone

As you twirl the dial, the machine records the number in its "switch-pad" memory along with any special instructions, such as "transfer" or "conference call." It searches other memory sections for *your* number and instructions on what actions to take. Each memory digit is represented by a group of magnetized flyspeck-size spots on a card. A stack of cards holding 350,000 bits of information would fit into a cigar box. Every five millionth of a second, sensing pulses race through the cards, feeling electrically which areas are magnetized, which not. When you finish dialing, ESS flips the necessary switches to set up your telephone connection.

"ESS can do all these tricks because it works with computer-type circuits and has a computer-type memory," says R. W. Ketchledge, who has been nursing ESS through its growing pains for the past 10 years. "We can write instructions into the machine for almost any telephone service you want—just as you can program a computer for many different jobs. But the real forte of ESS is reliability. We had to build an immortal machine—one that would run 40 years without a single breakdown."

Watching the watcher. Basically, the setup consists of two ESS units working in tandem, each constantly checking the other. If trouble develops, the good unit takes over. During the shakedown trials, an accidentally misplaced piece of wire caused ESS to foul up 33,000 times a second. But not a single call went astray. ESS had plenty of time to substitute a good circuit for the shorted one during the "long" intervals between the 33,000-per-second breakdowns.

"ESS gives itself a thorough physical exam every few microseconds," Ketchledge explained. "It diagnoses its own trouble and taps out its own cure on a teletype."

Repair of ESS is simply a matter of removing a preassembled plug-in circuit board and substituting a new one following the machine's instructions.

As I walked along the rows of cabinets that comprise ESS, I noticed a set of tape reels. From the stop-and-go jerking of the reels, it was evident the recorder was taking down information.

"What does this do?" I asked.

"Ah, that's the most important part of all," grinned Ketchledge. "That's what adds up your telephone bill." PS

BOND STREET
THE
PIPE TOBACCO
THAT STAYS LIT!
Bond Street keeps burning because of its Old English cut—a combination of flakes for even-burning and cubes for slower-burning. You'll like its aroma of fine domestic and imported tobaccos, too.
Light up wall-to-wall
When you light the whole tobacco surface, your packing will burn evenly and smoke cool. If the surface is not lit wall-to-wall, tamp very lightly and finish the job with a second light.
Give a man a pipe he can smoke . . . and his home is bright with a calm delight.
THOMSON
BOND STREET
PIPE TOBACCO
A product of Philip Morris Inc.

SAVE ON Imported & Domestic WOOD
CRAFTSMAN WOOD SERVICE COMPANY
CABINET HARDWARE - VENEERS - TOOLS
EVERYTHING for the Wood Shop
New 1966 Catalog Ready!
OVER 1500 ITEMS at MONEY SAVING PRICES! Finest domestic and imported hardwoods . . . all dimensions. Hardwood veneers. Power tools at discount prices. Hardware, lamp parts, upholstery supplies, mosaic tile. Hard to find inlays, bandings, etc. Get new catalog . . . send name, address and enclose 35¢ to pay postage, handling.
CRAFTSMAN WOOD SERVICE CO. Dept. B-125
2729 S. MARY ST., CHICAGO, ILL. 60608

Urheberrechtlich geschütztes Material

Rocket Cameras Show Booster Behavior

[Continued from page 107]

about as thick as ordinary knitting yarn. The body of each glass fiber is transparent; its surface is mirror-coated. Therefore a light beam entering the fiber at one end will be mirrored down the fiber and emerge at the other end, no matter how the fiber is bent or twisted. So, when an optical image is cast on a raster of thousands of front ends of parallel-bundled fibers, the same image will appear on a raster of correspondingly oriented rear ends.

The capsules are ejected when the Saturn I booster is traveling at about 8,400 feet per second (roughly, 5,700 m.p.h.). This is done by catapulting the capsule out of a tube, with the help of pressurizing nitrogen gas. Immediately on leaving the catapult tube, the capsule extends spring-loaded flaps for aerodynamic stabilization.

Each capsule contains a "paraballoon"—an inflatable sphere, with a parachute-like drag skirt attached. At an altitude of 14,000 feet, an aneroid switch causes the bladder of the paraballoon to inflate with pressurized nitrogen. The expanding bladder's pressure, severing shear screws, detaches the entire aft cover (including the stabilizing fins) from the capsule.

Continuing to inflate, the paraballoon reaches its full 18-inch diameter. The combined drag of balloon and skirt slows the falling capsule to a terminal velocity of about 100 feet per second (68 m.p.h.), the speed at which it strikes the water. The inflated paraballoon provides enough buoyancy to keep the capsule afloat.

Advantages of camera capsules. Why are recovered film capsules so valuable? The answer is found in the fundamental difficulties faced by every rocket designer.

A developer of a new aircraft can learn how his brainchild behaves and handles from the test pilot. Built-in flight recorders provide further data. And test flights can be repeated, barring a serious accident, until both the designer and the test pilot are happy with the results.

A developer of a space-launch vehicle is in a less enviable position. His large rockets cannot be flown back to base. While his vehicles are still in the experimental stage, he must equip them with artificial eyes and ears—and see to it that he can evaluate, on the ground, what those eyes and ears see and hear during a flight.

The traditional way to get data in flight has been telemetry. But radioing such information as pressures, temperatures, and voltages to the ground has limitations.

During the development of the Saturn I launch vehicle, for instance, we wanted to know how the second-stage engines ignited, and how the second stage separated from the spent first stage. We wanted to find out, too, whether or not the first stage's oxygen tanks were properly designed to permit complete emptying. Did a vortex, such as you see when a bathtub drains, let pressurizing gas enter the liquid-oxygen feed line prematurely—before the liquid level neared the bottom of the tank? Telemetry is not too well suited to answer such questions. It takes artificial eyes to see what goes on in stage separation—and whether a vortex develops in that LOX tank.

In some cases rocket designers have successfully used small television cameras—but this has limitations, too. During the stage-separation sequence, small solid retrorockets retard the exhausted first stage; the second-stage engines are ignited; and small solid "ullage" rockets settle the liquid propellants on their tank bottoms. These fire-spitting operations interfere with telemetry or TV communication between rocket and ground, at this vital phase of a flight.

It is in such situations that ejectable motion-picture-camera capsules prove their worth—and justify the effort needed to find them and fish them from the sea.

Built-in recovery aids. To help in locating and retrieving it, a camera capsule provides these features:

- A small radio beacon, on the upper part of the paraballoon, enables aircraft and ships to home in on the floating capsule.
- A high-intensity light beacon, flashing 20 times a minute, aids night recovery.
- A dye marker colors the surrounding water green with a fluorescein dye—an aid of proven value for daylight recovery.
- The painted pattern of the paraballoon contributes to safe recovery. Alternating white and day-glow orange panels, above the waterline, give high visibility. The hemisphere below the waterline is a dark purple, to be least attractive to nosy fish.
- A shark repellent of proven effectiveness, cupric acetate, is released into the surrounding water. It prevents the paraballoon—and the paradiver recovering it—from ending up in a shark's stomach. PS

Urheberrechtlich geschütztes Materia

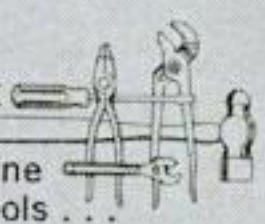
In his hand or yours...

Tools by

CHANNELLOCK®

get the job done easier...faster, year after year!

If you like the feel and performance of quality hand tools, your choice will be CHANNELLOCK. Drop forged of tough, high grade steel. Precision made in every detail. Beautifully finished. Built to last. Specify CHANNELLOCK . . . you'll be glad you did.



FREE Catalog showing complete line of hand tools . . . yours for the asking.

CHANNELLOCK, INC. *Meadville, Pennsylvania*

Formerly Champion DeArment Tool Co.

Urheberrechtlich geschütztes Material

Crazy Gadgets of "The Man from U.N.C.L.E."

[Continued from page 47]

and throw the switch. A small light on the top glows ominously, powered by the inner works: two penlight cells. Still another is made of three separate wood blocks (so it can be kept unassembled to prevent premature detonation) and held together at zero hour with magnets. A wristwatch "timer" blows the villains to kingdom come at the appropriate moment.

Also at hand are various small "bombs" and "dynamite caps" for blasting doors and locks, varicolored containers for different types of "gases," and a "three-meter cyanide bomb." The latter is made from a glass cigar case, a button, a paintbrush handle, and a rubber eraser. Fill it with milk (the "cyanide") and it's ready to go.

The side arms. The celebrated U.N.C.L.E. gun is basically a wicked-looking Walther P-38 semiautomatic German-made pistol equipped with shoulder holster, scope, and silencer. On the program, it usually fires "sleep-darts"—only Thrush agents are nasty enough to use "real" bullets in their guns. The darts are capable of knocking out the opposition from five hours to five days. The pistol becomes a carbine when the 3¼-inch pistol barrel with silencer is replaced with a 12-inch carbine barrel.

The Thrush gun is a conventional Army surplus carbine equipped with compensator and dummy infrared light and snooperscope, but these villains have also been known to use the new cane gun, which fires deadly gas cylinders. Used by U.N.C.L.E. agents from time to time is a .32-caliber pistol built into a cigarette lighter (flip the lighter lid and the pistol fires), and a gas gun that looks like a miniature camera but fires gas pellets through its lens.

Although the background settings for U.N.C.L.E. vary greatly from one episode to another, they also incorporate pseudo-scientific equipment ranging from brain-killing machines, dynamite-loaded robots, and atomic reactors to the computers, control consoles, and automatic doors of U.N.C.L.E. headquarters. Impressive as the latter look, they sometimes create problems: The doors, which are not really automatic but have to be opened and closed on cue by a prop man, have occasionally caught Vaughn or McCallum dead center.

If any testimony were needed as to the plausibility of the U.N.C.L.E. gadgets, it's eloquently provided by the letters and phone calls received by MGM, producers of U.N.C.L.E. for NBC.

Recently the press department at MGM was startled to receive a letter from a real agent of the C.I.A. One episode of U.N.C.L.E. showed a "microdot"—a piece of microfilm containing secret information that could be hidden under a false fingernail. C.I.A., MGM learned, uses almost the same device.

Agent to agent. And when Robert Vaughn was in Minneapolis with Vice-President Hubert Humphrey recently, U.N.C.L.E. received yet another tribute from the professionals. Although the Secret Service agents guarding the Vice-President were busily engaged in looking at windows, rooftops, and other locations that might conceal a sniper with a rifle, one found a moment to come over and speak to Vaughn.

"Mr. Vaughn," he said quietly, "I'd like to ask you for U.N.C.L.E. membership cards for myself and the other agents assigned to the Vice-President."

"You must be kidding," Vaughn replied.

"We never kid," said the agent.

As a result of his request, there are now a number of card-carrying U.N.C.L.E. agents among the Secret Service.

The U.N.C.L.E. membership cards, invented to help publicize the show, have become so popular that MGM is now sending out 70,000 a month, and estimates that there are currently close to a million "accredited" U.N.C.L.E. agents. Chuck Painter, MGM press agent who helped PS get the inside story on U.N.C.L.E.'s famous gadgets, tells a story about his U.N.C.L.E. card, which he has had edged with gold.

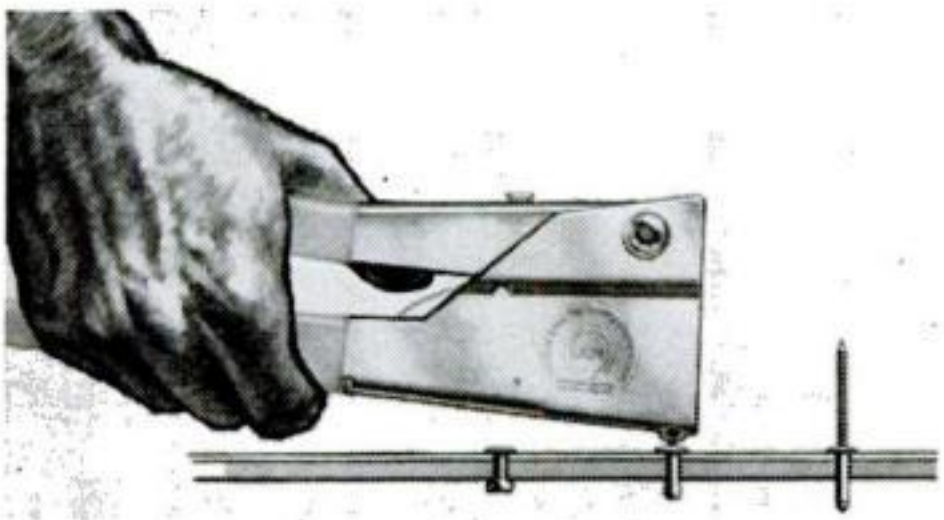
"I was going five miles an hour over the speed limit," he says, "when I was stopped by a Los Angeles cop. When he asked for my driver's license, he couldn't help seeing my U.N.C.L.E. card, which was right beside it. He studied it for a moment and then asked me what it was. All I told him was that it was *so* secret that I couldn't even discuss it. So help me, he let me go!"

Thinking that it must be great fun to be present during a taping session when U.N.C.L.E. and Thrush agents clash head-on with carbines, gas, poison, bombs, and what have you, I asked Painter if he spent much time on the U.N.C.L.E. set.

"Not me," he replied. "It's just too darn dangerous." PS

Urheberrechtlich geschütztes Material

Most useful tool to give or receive



Year 'round and all around the house, you can fix or fasten many things better and faster with "POP" Rivets. Use them in place of screws, bolts, adhesives, soldering.

What a timely gift to "Open BEFORE Christmas." A "POP" Rivetool is ideal for making decorations, assembling toys, kits and other Christmas preparations.

Kit, in gay Christmas package, includes "POP" Rivetool that sets both ⅛" and 3/16" dia. rivets from one side—plus 3 boxes of rivets. A $6.93 value at a happy holiday price of only $5.95.

ASK YOUR HARDWARE DEALER FOR A "POP" RIVET DEMONSTRATION

USM

FASTENER DIVISION
United Shoe Machinery Corporation
Shelton, Connecticut 06485

Urheberrechtlich geschütztes Material

Build This Earthquake Detector

[Continued from page 138]

Thread this rod the same distance as the length of the can. Thread pitch is not critical—a suggested pitch is 14 to the inch. Insert the unthreaded portion of the rod through the can and solder the rod securely in place.

An old kitchen clock makes an ideal drive for the drum. File the set knob square. Bend a short metal sleeve to fit snugly over this knob, and solder the sleeve to the unthreaded end of the brass rod. Hang the clock to the supporting arm with a length of stout fishline. Make the shaft support from a piece of light sheet metal (it must be iron). Cut or file a V in the metal to guide the threaded rod.

The timer. To interpret a seismogram, you must have time marks directly on the recording. A simple system for doing this is shown in the drawing. Every 60 seconds, the second hand of the clock sweeps across the mercury cup, closing the circuit and activating the electromagnet. This is mounted close alongside the recording-drum support. When on, it momentarily pulls the sheet-metal support a bit to one side. The result is a series of notches in the trace—one minute apart. Once an hour, the minute hand contacts the mercury, and leaves a longer hour-dash mark on the recording.

Current for the electromagnet comes from a 6.3-volt, one-amp filament transformer you can buy from any electronics-supply store. Wind 300 feet of #24 magnet wire onto a 3″ length of 1″-diameter wood dowel. Cement this in a hole drilled in a scrap block of wood. Mount it so that the end of the electromagnet is about $\frac{1}{16}$″ away from the recording-drum support. If it doesn't deflect the support, add turns of wire.

Final assembly and check-out. To put your seismograph in operation, set it on the cement floor in a corner of your cellar out of drafts and traffic. You cannot record from upstairs rooms. Center the pendulum by adjusting the leveling bolts in the ends of the base strips. Put a drop of light machine oil on your fingers, and very lightly lubricate the support pin on the magnifying lever. Insert it in the glass bearing. With the pendulum in motion, check the period of vibration at the stylus end. You must have 14 or more seconds or you will not record properly. Adjust by moving the pendulum bob as described previously.

Cut off a strip of glazed shelf paper, wrap it around the drum, and secure it in place with rubber cement along the edge. Light a kerosene lamp and turn up the wick to get a smoky flame. Taking care to rotate the drum continuously in your hands, give it a smooth, even coat of soot. Put the smoked drum back in place, engage the rod and the clock, and start the drive.

You will notice the stylus recording a continuous line as the drum revolves. Move back about 2′ from the side of the instrument and watch the stylus swing across the paper. It should move at least 2″, and if excellent balance has been obtained, maybe as much as 3″ or 4″. This is known as the "tilt check," and your seismograph must pass it before it will work. If you don't get a minimum 2″ swing, recheck the balance on your magnifying lever.

Once a day, stop the clock drive and remove the record. Handle it carefully as it smudges easily. To preserve your seismograms, spray them with clear acrylic spray. When dry, store the seismograms away flat in a large envelope to avoid damage.

What to expect. The type and number of tremors you record on your seismograph will depend on where you are located and how well you have balanced your instrument. If you're near a seismically active area, such as the West Coast, you'll pick up a lot of earthquakes. But there is always the excitement of unexpected local shocks and tremors from traffic, distant quarry blasts, and many other sources. There are seasonal variations, too: Seismic activity is more pronounced in winter and at times of heavy storms and high winds.

Your instrument is sensitive to vibrations taking place in its field. Thus, if you align your seismograph on a north-south axis, it will record vibrations from the east or west. It is obvious that a complete station needs two instruments set at right angles to cover all directions. In practice, many amateur observers get along with one instrument because most earthquakes at any one station usually come from the same direction—the nearest seismically active area.

While sometimes you'll register a quake 12,000 or more miles away, the range of your instrument (about 5,000 miles on the average) is really proportional to the magnitude of the quake, and sometimes lesser quakes only 1,000 miles away will go undetected. PS

Urheberrechtlich geschütztes Material

Don't Buy Batteries Save $—Recharge Them!

over and over up to 15 times or more
the **EVERLITE** — the best — charges
more than all the rest.

Only the New EVERLITE

- **Charges 6 at one time.**
- **Charges 3 times faster.**
- **Charges *all* batteries.**

Be prepared. Always have fresh batteries when you need them. The EVERLITE is the only charger made which charges **all** batteries, flashlight, lanterns, toys, radio, telephone, hearing aids cameras—yes even mercury cells. Save money and have the convenience of fresh batteries always.

The EVERLITE is the best—**the only charger** built with a powerful magnetic energy winding. This power enables it to charge big lantern batteries and even car batteries. Also plays transistor radios on 115V. house current charging the batteries at the same time. **Charges all batteries better.**

Two models—the EVERLITE 75 for all dry cell batteries up to 12 volts and the EVERLITE 76 for all dry batteries **plus** a special charge for car batteries to assure fast starts on cold mornings. Simple, safe, fool-proof and unbelievably efficient. Plug into any 115 volt outlet. Guaranteed for one year. Send for your EVERLITE now—10 day money back guarantee,—You must be satisfied.

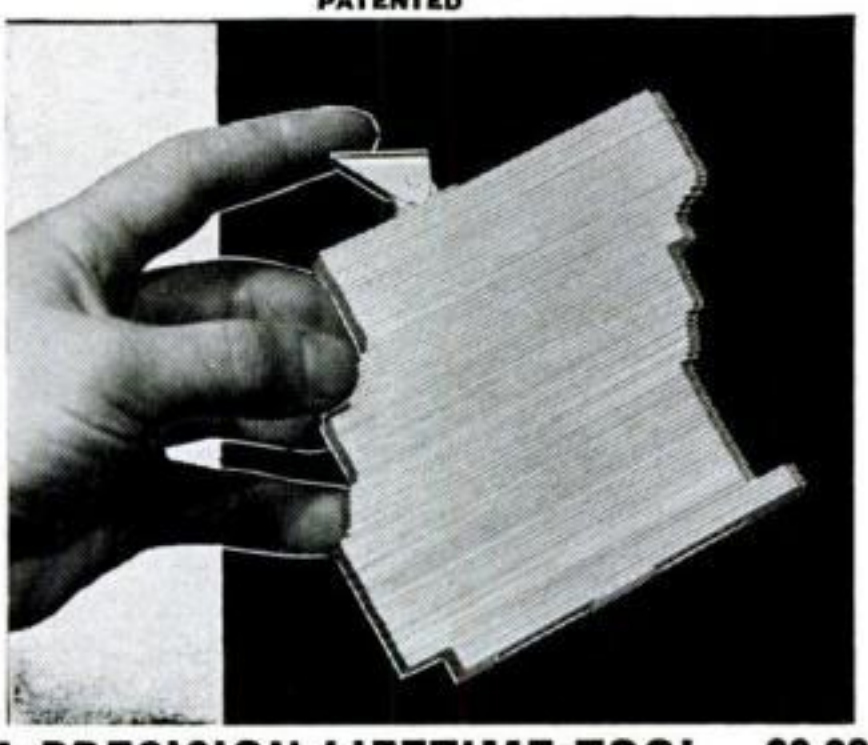
New transistorized model only **$6.95**

Model 75

Free battery tester and adapter for special batteries included.
The EVERLITE 75—send $6.95 plus .65 for shipping.
The EVERLITE 76 (including car battery kit)—send $8.95 plus .75 for shipping.

CONTOUR COPY

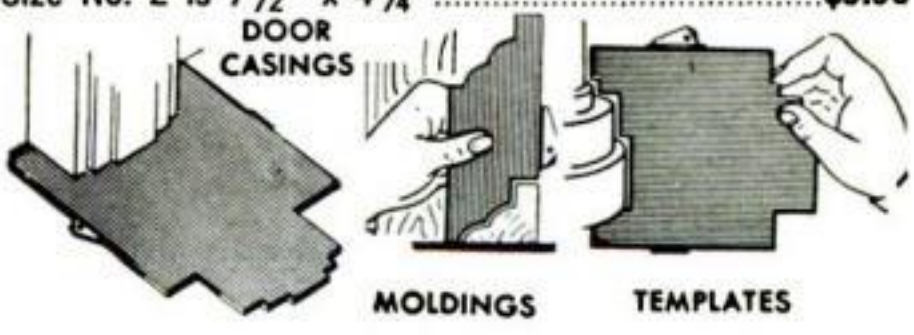
PATENTED



A PRECISION LIFETIME TOOL—$6.90

Made of hardened aluminum alloy—will retain its accuracy indefinitely.

Size No. 1 is 4¼" x 4¼" **$6.90**
Size No. 2 is 7½" x 4¼" **$9.90**



COPY ANY CONTOUR INSTANTLY
Perfectly Accurate Every Time.

SAVES HOURS—SAVES MATERIAL. Can pay for itself on one job. The perfect tool for fitting in against door casings, bath fixtures, mouldings, pipes, sinks, masonry, etc. A real boon to pattern makers, sheet metal mechanics, tool makers and body men.

EASY TO USE—just push the gauge leaves against any contour and lock. A perfect template every time. Works against any surface or any material.

Order Now from Master Mechanic Co.

Send $1.00 deposit if you wish C.O.D. shipment.
All items guaranteed for 1 year plus 10 day moneyback guarantee. Immediate delivery.

Mail order to Master Mechanic Co. Dept. B125
Box A, Burlington, Wisc., or Box 98, Sarasota, Fla.

Send_____EVERLITE 75 chargers $6.95 ea. plus .65 shipping.
Send_____EVERLITE 76 (incl. car battery kit) $8.95 ea. plus .75 shipping.
Send_____No. 1 Contour Copies $6.90 ea. plus .55 shipping.
Send_____No. 2 Contour Copies $9.90 ea. plus .65 shipping.

Name_____

Address_____

City_____ State_____ Zip_____

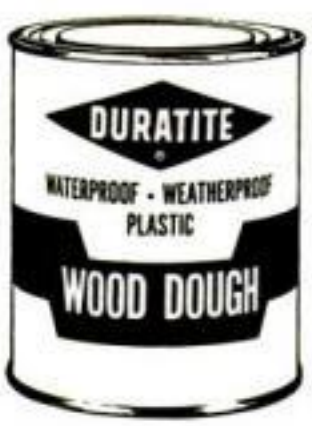
Urheberrechtlich geschütztes Material

Here's your edge...

...for handsomer home workshop projects. Weldwood® Flexible Wood-Trim® is real wood veneer in handy 1"- and 2"-wide rolls. Simply glue it on. For edging plywood, achieving inlaid effects, trimming lamp shades, etc. In walnut, oak, fir, mahogany, Korina®, birch. United States Plywood, Kalamazoo, Mich.

REPAIRS WOOD

DURATITE® WOOD DOUGH



Molds like dough—hardens into wood you can sand, saw, nail, drill, paint, stain, varnish or shellac. The plastic wood filler preferred by professionals—fills deep holes in one application. Natural and 8 matching wood colors. Sold at leading hardware, building supply, paint and specialty stores.

DAP® DAP INC., Dayton 31, Ohio
SUBSIDIARY OF *Plough, Inc.*

Henry Ford II Talks About Car Safety

[Continued from page 65]

severely overtaxed. On the average, the driver must make up to three observations a second, and each observation requires a decision. He must make up to 120 changes in speed or direction a minute. Obviously, it would be helpful if the driver could relieve the burden on his eyes by receiving at least some information through his ears.

Our Radio Road Alert System is still in the experimental stage, but it demonstrates the feasibility of using low-power roadside transmitters to broadcast appropriate messages to passing drivers through their car radios. In this way, the driver learns of road hazards well in advance. The system could also warn him of approaching emergency vehicles, remind him of speed zones, or tell him that he is nearing a particular intersection. It could, in effect, serve as a communication link between the road or traffic officials and the driver.

Other devices on the planning boards or being dreamed of would electronically sense the approach of another vehicle, automatically apply brakes in dangerous situations, automatically inform the driver in advance of mechanical trouble, and adjust the car's handling characteristics to suit the driver and the highway.

Exciting as these possibilities are, there are still great gaps in the knowledge necessary to make highway travel as safe as possible.

More and better information is needed about the relationship between accident frequency and vehicle characteristics, including age and quality of maintenance; about human body tolerances to sudden deceleration forces; about the tasks involved in driving; and about the best ways to teach and test driving skills.

We need to know much more about the interrelationships among the four main elements in highway transportation. We need to study systematically how various possible changes in each of these elements would affect our ability to achieve the major goals of our highway transportation system—safe, quick, dependable, low-cost transportation.

Until we have this kind of information, we cannot assess with accuracy the relative merits of different approaches to highway safety. This, in turn, means that it is difficult to establish intelligent priorities based on sound knowledge of where the American

Continued

Urheberrechtlich geschütztes Material

Shrinks Hemorrhoids New Way Without Surgery Stops Itch – Relieves Pain

For the first time science has found a new healing substance with the astonishing ability to shrink hemorrhoids and to relieve pain — without surgery.

In case after case, while gently relieving pain, actual reduction (shrinkage) took place.

Most amazing of all — results were so thorough that sufferers made astonishing statements like "Piles have ceased to be a problem!"

The secret is a new healing substance (Bio-Dyne®)—discovery of a world-famous research institute.

This substance is now available in *suppository* or *ointment form* under the name *Preparation H®*. Ask for it at all drug counters.

GENUINE ALNICO MAGNETS

AMAZING, PERMANENT, NON-ELECTRIC, HIGHLY PRACTICAL

Conduct interesting experiments. Hundreds of uses. Retrieve valuable steel items such as guns, tackle from fresh or salt water, tools from tanks and drains. GUARANTEED. Try any magnet one week. Money back if you are not well pleased.

S-710 (Wt. 53 oz.) Has pull of 225 lbs. on steel block. . . . **$18.50**
S-625 (Wt. 49 oz.) Has pull of 125 lbs. on steel block. . . . **$12.50**
S-575 (Wt. 18 oz.) Has pull of 75 lbs. on steel block. . . . **$ 7.50**
S-500 (Wt. 13 oz.) Has pull of 50 lbs. on steel block. . . . **$ 5.50**
S- 90 (Wt. 5 oz.) Has pull of 15 lbs. on steel block. . . . **$ 3.50**
S-44 Rod Magnets for Electric Guitars 1/4" DIA. x 1 1/4" 12 for **$ 4.00**
S-300 Kit of flat bars—5 pairs (10 magnets) . . . . . **$ 3.00**
S-47 Hot pad magnets . . . . . 10 for **$1.00** . . 50 for **$ 4.87**
S-35 Science experimenter Kit of 8 magnets. . . . . **$ 2.00**

SEND M.O. OR CHECK—WE PAY POSTAGE—SORRY NO C.O.D.'s
MIAMI MAGNET COMPANY, 3240 N.W. 27th Ave., Miami, Fla. 33142

GUNK®

ENGINE BRITE DEGREASER

SPRAY IT ON
•
HOSE IT OFF

CLEANS GREASY ENGINES IN MINUTES

at Service Stations, Auto and Hardware Stores

Insist on

AMERICAN®

FLEX-FOLD
All grades of Steel Wool Pads
HANDI-KIT
6 assorted Steel Wool Pads

At better hardware and paint stores—since 1896

HOME WORKSHOP ARC WELDER!

ELECTRIC WELD BRAZE, SOLDER, CUT ALL METALS
New 1966 Model

LIFETIME BURNOUT GUARANTEE—10 day money back trial. Works on any 110 volt "Plug in". Welds up to 1/4" steel with 1/16" to 1/8" rods. **EXTRA** Special twin pressure type arc torch (shown) develops up to 10,000 deg. heat—**HAS A MILLION USES**—for **CARS—HOME—FARM—FACTORY.** No experience needed—FREE Welding book teaches **YOU.** Thousands of users. BETTER MADE—Easier to use than ANY OTHER similar welder. **SEND ONLY $2.00** (cash, Ck, MO) and pay postman $12.95 COD Pstg. or send $14.95 for postpaid delivery in USA. COMPLETE ready to use with 12 ft H.D. Cables, Arc torch rod holder, carbons, welding and brazing rods, flux solder, work clamp and full face mask. **FREE EXTRA** "Dark" eye goggles—if you order at once. This **BEST FOR THE MONEY** welder sold **ONLY** by MIDWAY WELDER, Dept. DPS-12, Kearney, Nebr.

For every man's Dream Workshop!

QUALITY AT A NEW LOW PRICE

$129.88

NEW DeWALT®

HOME SHOP

Never before has such a versatile power tool been offered at such a low price! It does the work of many different tools with a precision and accuracy no portable tool could match. 8" saw blade. Build a bookshelf . . . build a house . . . build anything! See the **R-1150** at your DeWalt dealer today. Try it. It's a "dream workshop" in one easy-to-use package.

TWO OTHER MODELS TO CHOOSE FROM

A 9" Power Shop with a built-in brake. Sure, simple controls, unlimited flexibility, jet-age styling. Cuts 2½" deep. Makes any man an instant expert.

Model R-1250 $199.88

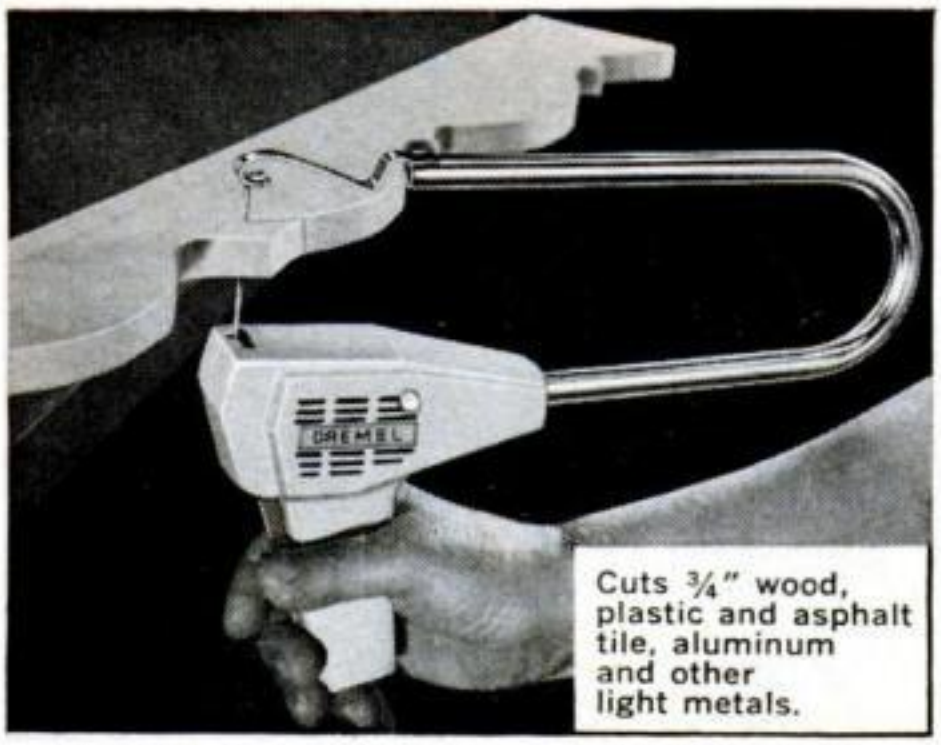
The ultimate in Power Shops! Features exclusive Top Circle of Control—all controls up front and above table for easy handling, safety. 10" blade cuts 3" deep. Looks and performs the way a dream workshop should. See your DeWalt dealer today. **Model R-1450 $279.95**

B·D DeWALT®

The Black & Decker Mfg. Co,
Dept. P-125, Towson, Maryland 21204

Enter the Black & Decker DREAM WORKSHOP SWEEPSTAKES
1150 Fabulous Prizes
See your dealer for entry forms

Urheberrechtlich geschütztes Material



Cuts ¾" wood, plastic and asphalt tile, aluminum and other light metals.

NEW DREMEL ELECTRIC SCROLL SAW

You'll find uses for this new Dremel you couldn't accomplish with any other type saw. And it's so safe the whole family can use it. Ideal for making home repairs and improvements . . . projects like cornices, valances, shelves. Makes fast work of the most intricate scrolls and curves. When laying asphalt, plastic or rubber tile, it easily cuts irregular shapes and curves so difficult to do with hand tools. Unique 4-way blade holder permits cutting in any direction and to center of 19" circle. High speed 60 cycle AC motor produces 7,200 strokes per minute. Foolproof, trouble free. Unbreakable nylon housing.

Model 501 Scroll Saw complete with 6', 3 wire cord and 7 saw blades.....$12.95

See your Power Tool Dealer or write for literature on complete Dremel line of power tools.

DREMEL MFG. CO., Dept. 65-L, **Racine, Wis.**

SAVE UP TO 85%

GOV'T SURPLUS and NEW EQUIP'T

Send 25¢ For 3 Big Catalogs

PUMPS
WELDERS
WINCHES
SURVEYING
TELEPHONES
HYDRAULICS
GENERATORS
ELECTRONIC
BINOCULARS
GEAR MOTORS
COMPRESSORS
SPEED REDUCERS
WEED SPRAYING
MANY OTHERS

SURPLUS CENTER Dept. PS-125 Lincoln, Nebraska

FOUR-WAY BEST LOW COST ARC WELDER YOU CAN BUY only $14.95 Complete

LIFE-TIME BURN-OUT GUARANTEE—10-DAY MONEY BACK TRIAL.

WELD, BRAZE, SOLDER, CUT. Tops in performance and value. Ideal gift, educational, profitable, enjoyable. No experience needed. Use ⅛" welding rods and ¼" carbons to make or repair auto bodies, fenders, trailers, boats, toys, furniture, farm equipment; garden tools, anything of metal. Operates on 110 V. line.

WORLD'S GREATEST WELDING VALUE. Over 500,000 in use by home owners, farmers, hobbyists, mechanics. **Life-time burn-out guarantee. You Get: FULL FACE SHIELD,** heavy metal cabinet, ground clamp, 12 ft. of heavy duty welding cables, twin carbon arc torch, rod holder, carbons, welding and brazing rods, flux, solder, instructions. Order on 10-day unconditional money back trial.

SEND ONLY $2.00 and pay $12.95 plus C.O.D. charges on delivery.

or send only $14.95 and we will ship prepaid. Order today.

FOUR-WAY WELDER CO. DEPT. W3-N 1810 S. FEDERAL ST. CHICAGO, ILL. 60616

Henry Ford II Talks About Car Safety

people should put their money to get the most safety.

These are the reasons why we support suggestions such as that by Senator Abraham Ribicoff for the establishment of a National Highway Safety Research Center in the Department of Commerce. We believe such a center could help determine the most effective expenditures of money and effort to improve highway safety.

Safer cars are industry responsibility

The skill and facilities to design safer cars exist only within the automobile industry, and the responsibility for vehicle design must, therefore, continue to rest with the manufacturers. We believe, however, that an expanded federal research program could help us pinpoint problems we can solve through better car design, as well as point the way to the most effective improvements in other elements of the highway transportation system.

For our part, we will devote whatever resources are needed to fulfill our responsibilities in the safety field. We are expanding the work of our Automotive Safety Center. We will incorporate additional safety features in our vehicles as fast as they can be developed and proved out. We are accelerating our work in the development of hardware and electronic equipment for improved traffic control and better highway communications. And we are enlarging our work in driver education, fleet-driver training, and improvement of licensing and vehicle-inspection programs.

For their part, state and local governments can take a number of essential steps. They can speed building of limited-access expressways. They can locate and eliminate high-accident areas on older highways. Those that have not done so can enact compulsory motor-vehicle inspection. They can upgrade driver-license requirements and weed out persons physically or emotionally unfit to drive. They can bring driver-training courses to all our youth. They can improve the enforcement of traffic regulations. And state and local authorities can join together to provide uniform traffic laws and highway signs.

And all of us, as drivers, can keep our cars properly maintained, use the safety equipment already available, and learn and practice the techniques of driving safely and courteously. PS

Urheberrechtlich geschütztes Material

AT LAST!

The lathe you've been waiting for . . . at a price you can afford!

Only $69.95! the METAL MASTER

"A precision-built bench lathe with powerful, positive drive . . . full 4¼" swing . . . all the features of a big lathe. Three models — 9½" to 28½" centers. Accessories never before available in this price range. Companion bench drill. *Send for Free literature.*

METAL MASTER **Metal Master Tool Company**
Mt. Ephraim, N. J. 08059

SEALMASTER
FLAPPER
TANK BALL

QUIET, POSITIVE ACTION . . . SEALS AUTOMATICALLY. READY TO INSTALL

STOPS WATER WASTE

AT HARDWARE STORES

BRONZE FOUNDRY

Since 1935

Schools ● Home Workshops, Inventors

Make your own castings of aluminum, copper, bronze, silver. Foundry sets are available in six sizes, capacity 1½ lb. to 48 lb. of red brass. 2400 Deg. F. blast furnace included with each. Write for Free Circular.

KANSAS CITY SPECIALTIES CO. Dept. S-12 P.O. Box 193 Middleton, Wisconsin

make your own *Gems*

36.50 F.O.B.

The Gem Maker comes complete with all necessary equipment, including a super-charged diamond blade for sawing, and all the wheels for grinding, shaping and polishing; also complete instructions. The complete equipment as shown, less motor and belt for only $36.50, f.o.b., Burlington, Wisconsin. Write today for information and literature.

B&I MANUFACTURING CO.
Dept. S Burlington, Wis.

Print Your Own

Cards, Stationery, Advertising, Circulars, labels, photo and movie titles, church work, tags, etc. Save money. Sold direct from factory only. Raised printing like engraving, too.

Own a Printing Business

Print for Others, Good Profit. Have home shop. Junior press $15; Senior $35 up. We supply everything. Easy rules. Pays for self in short time. Write now for free details.

Kelsey EXCELSIOR Presses.

KELSEY PRESSES, Z-33, Meriden, Conn.

AUTOMATIC RETOOTHER

MAKES NEW PROFITS

for HAND SAWS

Cuts new teeth in 50 seconds—any size 4 to 16 points. Old teeth fall off as chips. Easy to operate. A perfect job.

Free Literature!

BURR MFG. CO.
8943 VENICE BLVD. LOS ANGELES 34, CALIFORNIA

GIVE YOURSELF AN ALL-PURPOSE NICHOLSON FILE THIS CHRISTMAS

You probably won't get a Nicholson or Black Diamond file as a gift this year, so why not treat yourself to one?

Especially recommended this month is our Handy file—a combination single and double cut file with hang-up handle.

No matter what Nicholson or Black Diamond file you select, you'll want to be sure that you get the most out of it on the job. That's easily accomplished by sending for our free booklet, "File Filosophy." This is the booklet on files and their uses.

You can see the complete Nicholson or Black Diamond line at your local hardware store. Pick up some. They make great filing all year round.

NICHOLSON BLACK DIAMOND

Nicholson File Company, Providence, Rhode Island
Files · Rotary Burs · Hacksaw and Band Saw Blades
Hole Saws · Ground Flat Stock · Industrial Hammers

Urheberrechtlich geschütztes Ma

A New FREE BOOK for MEN PAST 40

Troubled With Getting Up Nights, Pains in Back, Hips, Legs, Nervousness, Tiredness.

This new Free Book tells that if you are a victim of the above symptoms, the trouble may be traceable to Glandular Inflammation . . . a condition that very commonly occurs in men of middle age or past and is often accompanied by despondency, emotional upset and other mental and nervous reactions.

The book explains that, although many people mistakenly think surgery is the only answer to Glandular Inflammation, there is now a non-surgical treatment available.

NON-SURGICAL TREATMENTS

This New Free Illustrated Book tells about the modern, mild, Non-Surgical treatment for Glandular Inflammation and that the treatment is backed by a Lifetime Certificate of Assurance. Many men from all over the country have taken the NON-SURGICAL treatment and have reported it has proven effective.

The Non-Surgical treatment described in this book requires no painful surgery, hospitalization, anesthesia or long period of convalescence. Treatment takes but a short time and the cost is reasonable.

REDUCIBLE HERNIA | HEMORRHOIDS

Non-Surgical treatment for both Reducible Hernia and Hemorrhoids, the book explains, can usually be taken at the same time as treatment for Glandular Inflammation.

This new Free Book is fully illustrated and deals with diseases peculiar to men and women. It tells HOW and WHY New Modern NON-SURGICAL Methods are so successful today. Fill Out Coupon.

Excelsior Medical Clinic, Dept. M 6250 Excelsior Springs, Mo.

Gentlemen: Kindly send me at once, your New FREE Book. I am interested in full information. (Please Check Box)

☐ Glandular Inflammation ☐ Hernia ☐ Hemorrhoids

Name.....

Address.....

City.....State.....

Booster Pump for Failing Hearts

[Continued from page 51]

was modeled after the magnetic-drive fuel pumps used in trucks. More recently, he has gone to the pneumatic drive now favored by all researchers in the field. Dr. Kolff and his assistants performed a spectacular feat more than a year ago by totally removing the heart of a calf and keeping it alive, conscious and apparently content, for 31 hours with an artificial pump.

Dr. Arthur Kantrowitz of Avco outlines possible future developments:

- "The first step," he says, "will be to implant the device we now have and make certain it works as we think it will. This will be for very sick patients at first and will use a bedside power unit.
- "Step two will be to miniaturize the power unit. I think we'll be able to reduce it to the size of an 8mm movie camera. Then the patient can move around freely.
- "Step three is a big one. We'll implant both the heart booster and the air pump and controls that work it, and get rid of the hole in the chest. Energy will be transmitted through the skin. We could do this electromagnetically with a coil of wire buried under the skin, and another coil taped on top of it outside. Or we might use a bulb buried under the skin with something to press it from outside.
- "Step four is the biggest one. There, we'd implant the whole thing—power supply and all." Just what kind of power such a unit could use, Kantrowitz isn't sure. A small atomic-power generator might be developed to do the job. Or a fuel cell might be designed to do it.

Dr. DeBakey has suggested yet another way to power an artificial heart internally. Under his ingenious scheme, a powerful but seldom-used muscle, perhaps in the shoulder girdle, could be arranged to press a bulb and work the artificial heart. Then a pacemaker, similar to those now used to operate hearts in which the electrical signal has failed, would be attached to the muscle. As the pacemaker generated its electrical jolts, the muscle would contract, press the bulb, and operate the heart.

But whether these advanced schemes or some yet unknown plan proves best, the artificial heart is on the way. Improvements will come over the years. Already, the first tentative steps have been taken toward conquering one of man's most dreaded killers. PS

Urheberrechtlich geschütztes Material

MK MICRO-KITS INC.

SCR CAPACITIVE DISCHARGE

FURY XII

ELECTRONIC AUTO IGNITION SYSTEM

- Instant starts in any weather!
- Plugs and points last five times longer!
- Eliminates high RPM missing!
- Increases gas mileage to 20%!

Designed for quality, engineered for low cost. Micro-Kits' exclusive design makes all others obsolete! All the advantages of capacitive discharge, PLUS solid-state electronics! All components are pre-tested for guaranteed performance. Compact, too! Measures 5½" L x 3⅛" H x 3-5/16" D.

Complete kit, only $39.95 assembled $69.95

MICRO-KITS FURY XII DELUXE MODEL IS GUARANTEED FOR 1 FULL YEAR!

Ideal gifts for the man who likes to make things work better!

New for Christmas!

Put Micro-Kits on your shopping list — for the man who expects real performance!

NEW! Fotofury Breakerless Ignition System!
The first and only capacitive discharge — SCR breakerless system! Features Infra-Red Light Emission from Gallium Arsenide diodes.
Micro-Kits complete kit, only **$99.95**

NEW! 250° Sweep Tachometer!
Can be used with Conventional, Transistor or Capacitive Discharge Ignition Systems!
Micro-Kits complete kit, only **$34.95**

NEW! Alternator Voltage Regulator!
Replace your old electro-mechanical voltage regulator with this new solid-state system!
Micro-Kits complete kit, only **$14.95**

Micro-Kits, Inc.
Dept. PS12
15547 S. Garfield, Paramount, Calif. 90723

- ☐ I encl. $39.95 for Fury XII Deluxe Kit.
- ☐ I encl. $69.95 for assembled Fury XII.
- ☐ I encl. $99.95 for Fotofury Breakerless Kit.
- ☐ I encl. $34.95 for 250° Sweep Tachometer Kit.
- ☐ I encl. $14.95 for Alternator Voltage Regulator Kit.
- ☐ PLEASE SEND FREE LITERATURE.

Name_____

Address_____

City_____ State_____

BETTER BUY

U.S. SAVINGS BONDS

for a BETTER FUTURE

SAW SHARPENING IS EASY

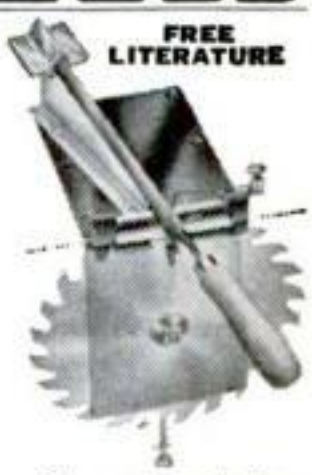
Super Filer No. 11 joints and sharpens circular saws 6" to 10" with all teeth correct in height, depth, pitch, bevel. When file hits steel roller, teeth are finished. Saw runs true with no side pull. Includes 8" file. **$9.95 PPD.**

"TRU-CIRCLE" saw set $2.95 ppd.

Gem Making Kits

NEW! Combination CABOCHON UNIT #63

A. D. McBURNEY Dept. S125
1610 Victory Blvd., Glendale, Calif.



It saws-grinds-polishes. Delivers complete, $77.25 ppd. less motor, includes belt. Nothing on market like it at near its low price.

130,000 CANDLE POWER
FLAME THROWERS

WARREN AUTOMOTIVE

Fits all 4 light systems—bright sockets. American made for American cars. 65,000 candle power in each sealed beam unit. Over 2½ times as bright as the factory stock brights. Lets you really see where you are going. **$9.95 pair**

Prepaid U.S.A. No C.O.D. please

Box 401 Skokie, Illinois 60076

MOTOR-MEDIC

- REDUCES ENGINE WEAR
- MAKES OIL LAST LONGER
- STOPS OIL BURNING

At Service Stations and Auto Supply Stores

Money Back Guarantee **HEAVY DUTY-ARC WELDER** **Five Year Guarantee**

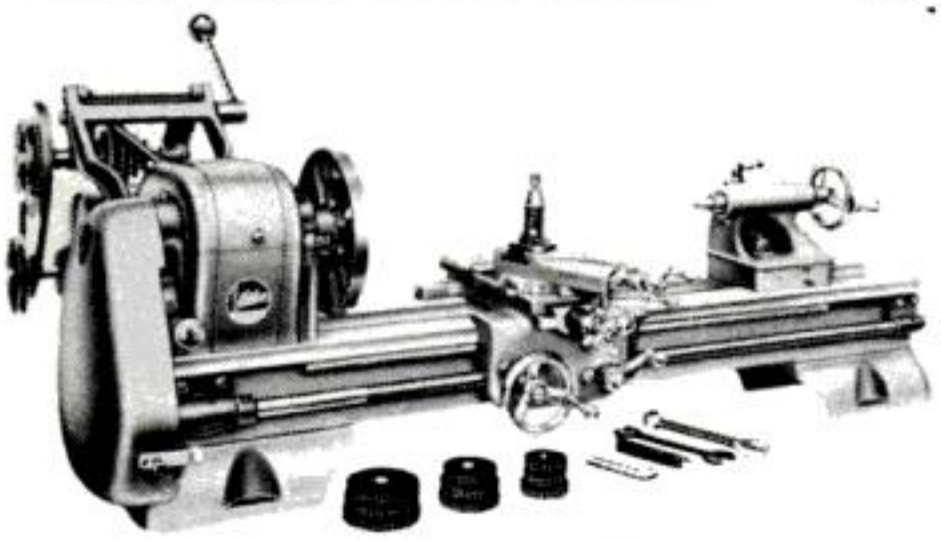
The New 1966 Model Heavy Duty 110 Volt Arc Welder works on any 110 volt house line. You can not buy a better welder anywhere at this low price. No experience necessary. Now anyone can braze, solder, and weld any metal up to ¼" thick. Generates heat up to 10,000 degrees for cutting through steel plate, etc. **NOTHING ELSE TO BUY.** Comes complete with 12 ft. of heavy duty power cable. 1/16" and ⅛" welding and brazing rods, rod holder, twin Carbon torch, helmet, instruction book, etc. **MONEY BACK GUARANTEE.** Try it for 10 days. If you are not completely satisfied we will immediately refund your money without question.—**FULLY GUARANTEED FOR FIVE YEARS.** If inoperative, we will repair or replace it free of charge. **SEND ONLY $2.00,** and when delivered, pay postman $12.95 plus COD postage, or send $14.95 and we will ship postpaid. Over 10,000 National Electric welders are in use throughout the world. (For an extra large supply of rods, carbons, and flux, send an additional $2.00.)

Order direct from factory: NATIONAL ELECTRIC, Dept. PS-12, DELRAY, FLORIDA

ONLY $14.95

Urheberrechtlich geschütztes Material

Get into metalworking



with an Atlas 6" Lathe

. . . it handles turning, screw cutting, drilling, milling, boring—a host of operations—with speed and precision. Equips you for making metal parts, repairs, models—can pay for itself in a few "moonlight" jobs. Best of all, with an Atlas back-geared 6" lathe, you develop your skill for the metal age for a small investment—only $197.50 F.O.B. factory.

Write for free catalog

ATLAS PRESS CO.

12-25 N. Pitcher St. • Kalamazoo, Mich.

506

PEEL OFF PAINT with KLEAN-STRIP

Heavy-Bodied wash type

- Fast, clean, safe
- No afterwash needed
- Non-flammable
- Refinish immediately

Regular for furniture work

THE KLEAN-STRIP CO., INC.

MEMPHIS 6, TENNESSEE • WINNIPEG, CANADA

BUILD REFINISH RESTORE

. . . anything of wood

LET Constantine's picture-packed Catalog & Manual help you build new furniture—refinish and restore beat-up cabinets, chests, tables, chairs, etc. See everything you need for better, easier woodworking. All materials plus plans, books, instructions. *60 glamorous woods in natural color.* Hundreds of products found nowhere else. 8-ft veneers! Fabulous glue that needs no clamps. Tool bargains. Cabinet hdwe, etc. *Unsurpassed values since 1812.*

2,000 CRAFTSMAN PRODUCTS

World's Beautiful Woods & Veneers
Newest Workshop Tools & Materials
Wood Finishes — All Kinds
Lamp Parts — Upholstery Supplies
Period & Modern Furniture Hardware
Colonial Clock Kits — Cane Kits
500 Project Plans! Instructions!

MAIL AD

Tear out ad. Mail with 25¢ for vast new CATALOG Plus New "101 Project Ideas"

CONSTANTINE

2050 Eastchester Rd., Bronx N.Y. 10461 Dept. T-6

Ford Fairlane vs. Plymouth Satellite

[*Continued from page 57*]

one of the Fairlane's strong points. On hard turns, it's a firm understeerer, fully predictable and obedient. Stability in crosswinds is partly a matter of suspension and partly of aerodynamics. The Fairlane is rock-steady in normal gusts and relatively indifferent to strong crosswinds, while the Satellite drifts off course under wind pressure from the side. The Plymouth is also overly sensitive to changes in road camber and needs constant steering corrections. Its steering response is good, but somehow the Ford steering, although slightly slower, feels more precise.

Both cars are reasonably quiet, but neither could challenge a Rolls-Royce. Mechanical noise is low, and road noise has been pretty well isolated from the interior of the unit-construction bodies. The Plymouth has a wind-noise problem that does not exist on the Ford. On the other hand, the Fairlane body had some rattles, and I found some ugly gaps.

Entry and exit. Getting into the rear seat on these two-door models is pretty simple. Step height is low (Ford—16 inches; Plymouth—15½ inches) and the big doors (Plymouth—45½-inch opening; Ford—43-inch opening) swing open to almost right angles. Front-seat backrests fold down, and the rear-seat passengers can bend over and walk in without losing balance. There's 11 inches from the rear edge of the door opening to the rear of the front seat on the Plymouth against a full 13 inches on the Ford. On width, the Ford body engineers have really performed miracles. With an overall width 2½ inches less than the Satellite's, the Fairlane rear seat adds a quarter-inch for good measure.

Ford has two-way keys for all locks, and has adopted the GM system of keyless door locking: Depress the knobs on the inside before slamming the door shut while the outside button is held in. On the Plymouth, there is no way to get locked out accidentally.

Making a choice. On good roads, the Ford would win on the basis of its directional stability. With fewer steering reversals, the driver is less threatened by fatigue. On bad roads, the Plymouth would win on the strength of its pitch control and shock damping, giving a more comfortable ride. In the city, it's a toss-up. Both have the advantages of costing less than their full-size sisters, while being almost as roomy and every bit as practical. PS

"JOHN F. KENNEDY" 1964-P MINT SETS

NOW...A GREATER GIFT THAN EVER—*Unconditionally Guaranteed*

The silver coins we have known will no longer be minted . . . the silver in the Kennedy half dollar reduced to 40%, no silver at all in quarters and dimes. We still have brilliant, uncirculated 1964 Sets, in sparkling plastic holders.

BIG STATE COIN CO. (Dept. A3E) • 1416 Commerce St. • Dallas 1, Texas

2.95 10 SETS 27.50 postpaid

Please send me ____ *'64-P mint sets*

NAME_____

STREET_____

CITY_____

STATE_____

☐ CHECK ☐ M.O. ☐ C.O.D.

WHAM-O $1.50 40-LB. PULL!

HITS LIKE A RIFLE—
KILLS RABBITS, SQUIRRELS

Powerful, silent, accurate
For hunting, target, routing pests

Sportsman's choice
sold world
over!

NEW! surgical quality pure gum rubber

40 heavy extra steel balls 20¢

HUNTING SLINGSHOT

Heavy duty ¾" ash stock.
40 heavy steel balls, extra rubber, adapter for shooting arrows.
GUARANTEED. Professional model of Nat'l Slingshot Assn. At dealers, or write
Wham-O Mfg. Co., Box 15-N, San Gabriel, Calif. 91778

NEW CATALOG
Hard-to-find tools

Exciting new tools rarely found in stores or other catalogs. For model makers, clock and instrument makers, craftsmen, hobbyists, light industry. Superb quality tools that solve problems, make projects easier, more fun. Send 10¢ today (stamps will do).

BROOKSTONE COMPANY
86 River Road Worthington, Massachusetts 01098

Build This Beautiful Grandfather Clock

We show you how at price you can afford. Send only $1.00 for complete plans and instructions plus catalog of clock movements, dials, blueprints and kits for constructing Grandfather, Grandmother, Terry and other fine clocks.

MASON & SULLIVAN CO.
DEPT. PS OSTERVILLE, MASS.

O'Connor Shooting Book $1

Get expert shooting know-how from Jack O'Connor in OUTDOOR LIFE SHOOTING BOOK. America's leading gun authority gives you top-notch advice and info on every kind of sporting firearm, ammunition and accessory. Large paperbound format. **Money-back guarantee.**

SEND $1 — WE PAY POSTAGE:
Popular Science, Dept. 1265, 355 Lexington Ave., N. Y.

SEE THE USA

BUILD YOUR OWN POWER TOOLS

METAL PARTS KITS AT LOW FACTORY DISCOUNT PRICES FOR:

- 10-IN. TILT/ARBOR SAW
- COMB. DRILL PRESS-LATHE
- 12-IN. BAND SAW
- 18-IN. BAND SAW
- 6-IN. BELT SANDER
- SPINDLE SHAPER

SAVE $50 OR MORE

PLANS Full Size Patterns $1.00 EACH DEDUCTIBLE

Kits from $15.50 to $39.95. Satisfaction guaranteed. Built and sold for 18 years. 45,000 units in use. Send for Plans today!

FREE CATALOG

GILLIOM MFG. CO. Dept. PS-12 St. Charles, Mo.

JEEP OWNERS

Re-Power NOW with a V-8 or 6 Cyl engine—Use

Ford - Chev - Mercury - GMC - Pont - Stude - Dodge or Plymouth in Jeeps, Jeepsters, Sta-Wgn, Trucks, Kaiser & H. J. cars. Conversion kits $45.35 to $56.90. Want fast action? Give us full information, send $15.00 Dep. and we will ship correct kit. Bal. COD. Send full amount for prepaid shipment. Wire, phone or write today. Details FREE.

HOOSIER MACHINE PRODUCTS CO.
314 S.E. 6th St. Phone 276-3442 Pendleton, Oregon

BASEMENT TOILET FLUSHES UP

TO OVERHEAD SEWER OR SEPTIC TANK.

NO DIGGING UP FLOORS. Write

McPHERSON, INC. BOX 15133 TAMPA, FLA.

'65 FORD OR DODGE

ONLY $999

'64 DODGE	$699
'64 FORD	$699

Ex-taxicabs. Taxicab signs and markings removed. **Present appearance no different than regular passenger cars.**

WRITE FOR FULL INFORMATION
OR PHONE, WIRE OR VISIT PREMISES

Phone: Area Code 201 866-7500—N.Y.C.: 212 244-1580

UNIVERSAL AUTO WHOLESALERS INC. Est. 1959

LARRY SHANDEL, President
235-B Penhorn Avenue, Secaucus, N. J. 07094
Only 10 minutes from N.Y. off U.S. 1 & 9

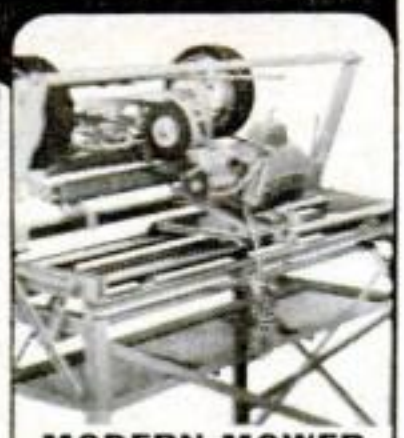
Bank reference: TRUST COMPANY OF NEW JERSEY, 457 West Side Ave., Jersey City, N. J. 07304.

Urheberrechtlich geschütztes Material

START A BUSINESS
in your neighborhood

Sharpen Hand or Power Saw with the

FOLEY SAW FILER



MODERN MOWER SHARPENER
Precision-grind all hand and power lawn mowers—a perfect job every time.

Start your business in sparetime and make CASH PROFITS right away. No stock to carry, no selling involved, no experience needed—the Foley Saw Filer does every sharpening job **automatically!** Earn $3 to $6 an hour sparetime in your own garage or basement. Profit 90c on every dollar.

Best of all, every saw you sharpen, will be resharpened again and again—watch your repeat business grow! Add cash to your income now, while you build retirement security with the Foley Saw Filer.

FREE BOOK shows how you can make money as thousands of others have. Send coupon today. There's no obligation, and no salesman will call—so write today!

Foley Manufacturing Co.
1219-5 Foley Bldg., Minneapolis, Minn. 55418
Send for FREE book on Money-Making facts about the sharpening business.

NAME_____

ADDRESS_____

CITY_____ STATE_____ ZIP CODE_____

CLOGGED SEWERS

SAVE COSTLY PLUMBING REPAIR

PATENTED CUTTERS CLEAN 1" TO 12" PIPE with Power

★ **FREE BOOK** Tells How To Clean All Drains

Valuable advice on removing Roots, Grease, Detergent, Rags in **TOILETS, SINKS, URINALS, BATHTUBS, SHOWERS, HOUSE-TO-STREET SEWERS.** Get rid of foul odors. Do your own rodding or start your own Business. Receive **FREE SKETCH** of Plumbing Pipeline in average Building. Save Plumbing Bills. Tear this ad out now and write your name and address beside it for helpful **FREE BOOK** on Power and Hand Units. No Agent will Call. (Chicago Phone Kildare 5-1702) **MILLER SEWER ROD, DEPT. PSR, 4642 N. CENTRAL AVE., CHICAGO, ILL. 60630.**

FOR HOLIDAY DECORATIONS

IF YOU PRIZE IT... *KRYLON-IZE* IT

How to Buy a Color TV Set

[Continued from page 74]

black-and-white show. Advantage: You don't have to compromise on an average screen background color that's suitable for both black-and-white and color as do dual-control set owners. Disadvantage: To use it properly, you should readjust the control setting every time you switch between color and black-and-white. And you have a second control to fiddle with when you're touching up skin tones.

Degaussing: Auto or manual? Nearly every color TV you can buy, except for a few price-leader models, has a built-in degaussing-coil assembly to neutralize the tube's shadow mask if it becomes magnetized. A degausser is a must since a slight trace of shadow-mask magnetization will upset the purity of the picture you are watching. Some degaussers are automatic—they switch on for a few seconds whenever the set is turned on.

Others are manual—you activate them by touching a back-panel pushbutton. Automatic degaussing is the most convenient; it's done without your thinking about it. Manual degaussing is most flexible since you can keep the degausser in action for long times if necessary.

Take a good look inside the set, too.

- Hand-wired or printed circuits? Let me go on record: It does not make the slightest bit of difference.
- High-voltage regulator. Every big-screen color set has one, to maintain the set's high voltage at a relatively constant level. Why? Without one, the picture would bloom every time brightness increased. Older color sets used elaborate shunt regulators that kept the high voltage rock-steady at all beam currents.

This year, many sets have adopted much simpler feedback-type regulators. Although they cannot regulate across the complete range of beam currents—you may see some blooming if the screen suddenly goes from dark to light—they are very effective within the range of beam-current variations that occur in most pictures.

- Tubes and tube functions. How many of each should there be? This year, not even the manufacturers are sure, and you probably won't learn much by playing the tube numbers game. Your best bet: Compare color-picture quality. If you like what you see on the screen, don't worry about how many tubes are putting it there. PS

Urheberrechtlich geschütztes Material

A GIFT OF PERFECTION

DROP DEAD

CIGARETTE BOX

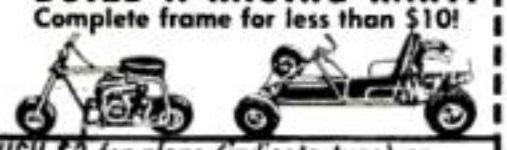
U.S. Patent

For the man who is dying for a cigarette, this 3¾" x 1" x 1½" completely metal, copper color coffin is a true replica of the real thing . . . Beware—your friends will fall in love with it. So-O-O buy several for gifts. No others like it! Send $2.00 for each prepaid DROP DEAD COFFIN to **Andrea Specialties, Dept. PS-5, 12514 Davan Dr., Silver Spring, Md. 20904**

KIDS!

Learn how you can buy used engines $15 up, new engines $30 with FREE confidential list and coupons when you order your plans

- **BUILD THIS MINI-BIKE!** Plans reveal step by step details!
- **BUILD A RACING KART!** Complete frame for less than $10!



RUSH $2 for plans (indicate type) or send 10¢ for brochure describing plans:
PLANS, Box 478, Dept. PS-12, Denver, Colo.

Bit by bit...every litter bit hurts!

KEEP AMERICA BEAUTIFUL!

---

zip code helps keep postal costs

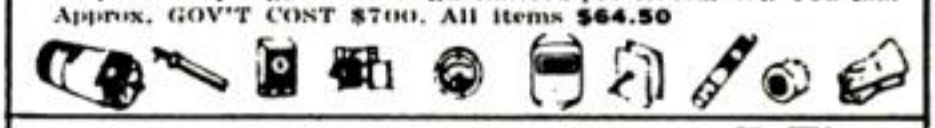
down

BUT ONLY IF YOU USE IT.

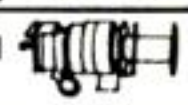
GOVT. SURPLUS AND OTHER BARGAINS SAVE UP TO 90%

AC-DC GENERATOR rated 200 AMP DC @ 24 to 30V. Also produces 1200 watts of AC current. Excellent for making your own arc welder. Also for lights and many cooking accessories. Size 14" L. x 6" dia. Tested prior to shipment. Shpg. wt. 55 lbs. Approx. GOV'T COST $350. Special **$14.95**

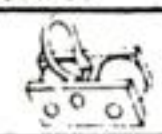
DC JET GENERATOR ARC WELDING KIT complete with GE Type CM Gen (30 V. D.C., 400 AMP, 3000 RPM: ampere rating is for continuous duty, intermittent amperage is 500 to 600 amps). Also 2 rheostats, 1 voltage reg., 1 voltmeter, 1 electrode holder, 1 welder's mask, 1 toggle switch, 10 lb. vacuum packed 1/8 in. welding rods, pair welder's gloves & spline coupling. All units guaranteed pre-tested. Wt. 110 lbs. Approx. GOV'T COST $700. All items **$64.50**



ELECTRIC STORAGE BATTERY WINCH



For use on 12 V.D.C. Heavy-duty ball bearing constuction 160-1 gear reduction. Reversible spool will handle 80' of 1/4" cable. 2000 lb. capacity. Ready to install & operate. 19" L. x 9" W x 8" H. Excellent for jeeps, trucks, boats, etc. Complete with mounting bracket. Shpg. wt. 60 lbs. Approx. GOV'T COST $400. New Model E. 90-day guarantee. **$59.50**



HEAVY DUTY MAGNET Fantastic power, will pull 125 lbs. on steel block. Excellent as underwater retriever. Picks up all ferrous metals. Dim. 4" x 2" x 1¾". **$7.95.**

NEW! BIG! 1965 CATALOG

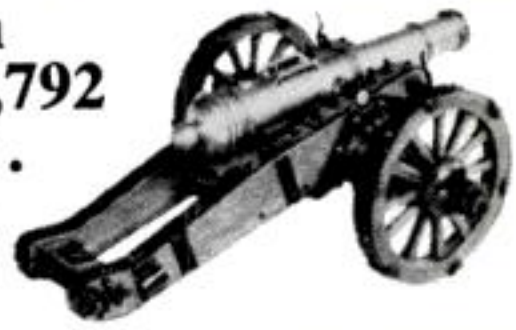
Send 25c for amazing catalog with 1000's of bargains in hydraulics; electrical, marine, automotive items, etc. Order from ad. Prices FOB. 50% deposit for COD. Pls. include your zip code number. Satisfying mail order customers thru-out the world since 1945.

AIRBORNE SALES CO. Dept. **PS1265**

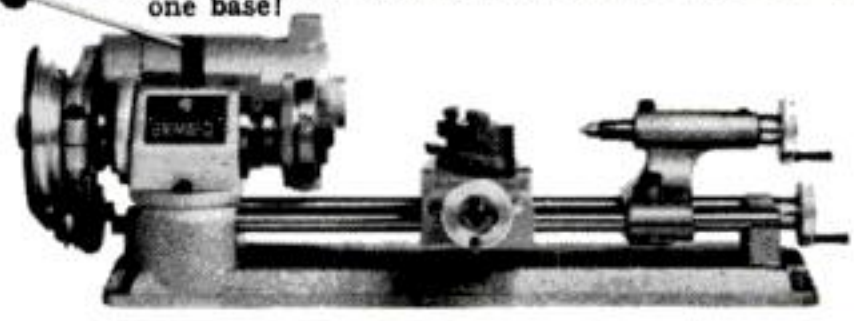
8501 Stellar Dr. • Box 2727 • Culver City, Calif. 90231

This cannon went thru 28,792 revolutions...

(Revolutions on a lathe, that is!)



You can create a museum-like replica of this 17th Century 12 pounder...with UNIMAT, a complete miniature machine shop quite revolutionary itself! Only 16" long, it's a precision lathe capable of completing the most detailed work. Within seconds it demonstrates its amazing versatility. UNIMAT converts into a vertical milling machine, drill press, surface grinder and more—all on one base!



UNIMAT'S uses are limited only by the imagination. Make model railroad and slot car racing equipment, electronic components, gas and steam engines, jewelry. Modify guns and rifles. Anything made of metal, plastic and wood.

UNIMAT operates with the accuracy of expensive toolroom equipment (.0005") at just a fraction of the cost. Basic UNIMAT sells for $139.50 and includes lots of extras. It's so easy to use...takes up so little room. And *no experience is necessary.*

To find out more about UNIMAT, just drop a card in the mail for free illustrated literature. To discover its *complete* personality, send $1.00 for "Miniature Machining Techniques"—a 40 page photo packed manual.

American-Edelstaal, Inc., Dept. HK-5, 350 Broadway, N.Y.C. 10013.

Urheberrechtlich geschütztes Material

$70,000.00 IN CASH PRIZES!

"Your $1,200.00 check arrived this morning by Special Delivery. Thanks ever so much for your telephone call and prompt payment. It still doesn't seem possible. It's been a great thrill."

That's the way Emory Mead of Albany, N. Y., just one of our many big winners, reacted to receiving his cash prize. Dozens of men and women of all ages have cashed in as members of our exciting PUZZLE LOVERS CLUB.

Our Club winners got their cash awards for solving puzzles in their leisure time. Our Club also has awarded huge prizes for many other kinds of contests.

We've awarded cash in hundred-and-thousand-dollar units to retirees, sewing women, farmers, salesmen, war veterans, office workers, clerks, secretaries — people who never before dreamed of having the kind of money that movie stars make.

This announcement is an invitation to you, as a reader of this publication, to find out for yourself if you have the talent to win up to $70,000.00 in cash. If you are over 18 and like to play word games of any kind, the information below may lead you to thousands of dollars in extra cash that you may use as you wish.

YOU Can WIN Each Month!

Members of our Club win cash prizes at home, just by solving puzzles and entering Club contests. They turn an educational and enjoyable hobby into pure profit. **You can too!**

Your chief advantage in contests sponsored by our PUZZLE LOVERS CLUB is that you have only limited competition. Only members of the Club may compete and win.

In 1963 we offered our members $35,000.00. We actually paid out more cash than we said we would—$35,511.25, to be exact. In 1964, we again offered $35,000.00. Again, we paid out more than we promised—$40,778.11. And now we're offering our members $70,000.00 in cash prizes. Most contest groups offer about $4,500 or $5,000 a year. **Our Club gives you the opportunity to win double that every month!**

As a member of our Club you will be eligible to enter every cash prize contest we sponsor and you'll get at least four new contests each month. You'll have three weeks to solve each set of contests. One week after the deadline, you'll receive a new copy of our **Puzzle Lovers Newspaper** with names and addresses of all winners, correct solutions, and your new puzzle contests. When YOU win, you receive your prize within two weeks.

"I still can hardly believe it," Mrs. H. C. Despain of Houston, Tex., wrote to us after receiving $1,000.00 in cash as one month's winnings. She is a seamstress who works for a living.

Raymond Smith of Sacramento has won over $900.00 in Club competitions. A retiree, Mr. Smith's first win was only $25.00. Then, as he practiced solving our puzzles, he won much more.

"I was amazed to learn I won $500.00," said Mrs. Florence Humphrey of Cincinnati. "The prize money came at a dandy time as I've had some debts to pay off. Thank you."

IT COSTS YOU NOTHING TO TRY OUR CONTESTS AND SEE IF YOU HAVE THE TALENT TO WIN

The coupon below will bring you, absolutely FREE, a sample copy of our **Puzzle Lovers Newspaper,** the only newspaper in the world exclusively devoted to contests (and it's published for members only). When your free copy of our newspaper arrives, sit down in a quiet place and read about our winners, our prizes, our contests. Try our stimulating word games to see if you can do them. You are under no obligation to enter our contests. If you do decide to go after our cash, there are no boxtops, no jingles to complete, nothing to buy.

Clip the coupon now and please be sure to print your name and address clearly. Then read about $1,000.00 winners like Mrs. Belle Smith of Yakima, Wash. Discover how hundreds of other members cashed in just by doing our puzzles in their spare time. Find out all about this exciting and profitable hobby now. You may receive your first big prize in a few weeks.

AFFIX THIS COUPON TO POSTCARD FOR FAST HANDLING OR MAIL IN ENVELOPE.

PUZZLE LOVERS CLUB **Box 2, Prince Street Station, New York City 10012**

Name_____

Address_____

City_____

State_____ Zip_____

Gentlemen,

Send me a **free** copy of your newspaper plus all details on your cash prize contests. I am under absolutely no obligation to pay anything. If I join the Club I may compete for all prizes and spend the cash I win any way I want.

PSM

ENJOY YOURSELF IN YOUR OWN HOME AND WIN EXTRA CASH!

WIN CASH MAIL NOW

Urheberrechtlich geschütztes Material

POPULAR SCIENCE MONTHLY
355 Lexington Ave., New York, N. Y. 10017

MAIL ORDER OPPORTUNITY MART

Products — Services — Opportunities, both classified and display for Popular Science's more than 6,000,000 top-notch prospects.

CLASSIFIED ADS $1.35 per word per insertion, payable in advance. Minimum ad, 10 words, $13.50. Advertisers using post office box number in ad must furnish complete name & street address for our records. Closing date for February issue (on sale January 29) is December 17th. No cancellations after December 15. Send copy and remittance to O.K. Kelley, Classified Adv. Mgr.

DISPLAY ADVERTISING rates on request. Write % H.B. Fleischman.

1 AUTOMOBILES & MIDGET CARS

AUTOMOBILE 1902, seats two adults. Plans $1.00; Kit $299.00. Box 9234, St. Louis, Missouri 63117.

BUY late model municipal automobiles ($340 to $500). 16-page illustrated booklet ($1.00) tells how. Save hundreds. Box 189, Wyandotte, Mich.

2 AUTO SUPPLIES & EQUIPMENT

AUTO welding repair training in world's largest non-profit welding school. Low tuition. Free booklet. Hobart Welding School, Box P-125, Troy, Ohio.

ANTIQUE Car Pistons, Gaskets, Gears, Valves, Etc. Catalogue $1.00. Antique Auto Parts, Millwaukee, Wisconsin 53204.

IGNITION. Delta's Patented Mark Ten Capacitive Discharge Ignition System, the world's largest selling SCR Ignition, fits all cars. Easy assembled kit $34.95, assembled $49.50. Acknowledged by engineers as the ultimate ignition system in feature articles in Popular Electronics, Electronics World, Electronics, and other engineering publications. Proven on thousands of cars, trucks, and boats. Connects to standard coil, no rewiring. Saves gas and 80% of ignition tuneups. Plugs last 5 times longer. Give you and your car a "treat," order your Mark Ten today. Satisfaction Guaranteed. Shipped postpaid. State Voltage & Polarity. Delta Products, Inc., P.O. Box 1147S, Grand Junction, Colorado.

ELECTRONIC Low Fuel Indicator. No gauge watching. Never run out of gas. Simple installation. By mail at great savings, only $9.80. Postpaid. Sales Unlimited, Box 209, Hopkins, Minnesota.

CROSLEY New, Used Parts. Box 7, Elmont, N. Y.

FOREIGN Car Parts, Discounts. Box 7, Elmont, N. Y.

JEEP Parts Catalog! Military and Civilian. For owners, dealers, garages, service stations. Save $$$. Surplus and replacements. American Auto Parts Co., 1830 Locust, Kansas City, Missouri.

MAGIC-Autoglass tint (16 oz. aerosol) $5.00. 6 Colors. Magic-quick release battery clamp $1.00. Exclusive Products Company, P.O. Box 12892, Tucson, Arizona.

FORD Parts 09-31. 32 Page Catalog 10c. Hank's, Quincy, Illinois 62302.

YUKON Engine Heater keeps engine warm all night or warms it up quickly before starting. Low priced. Particulars free. K & D, Box 1835-PS, Colorado Springs, Colorado 80901. (Service stations, dealers, write.)

CARBURETOR Air Filter device, lights, shows when filter replacement needed. Easy installation. $4.95 Guaranteed. Forrest Manufacturing, Potter Valley, California.

USE THIS HANDY INDEX TO FIND WHAT YOU WANT

Agents Wanted 43
Antiques, Relics & Indian Goods 29
Art Instruction, Cartooning, Sign Painting 54
Artists' Supplies 76
Astronautics 5A
Authors Service 52
Auto Supplies & Equipment 2
Auto Trailers 3
Automobiles & Midget Cars 1
Aviation 5

Batteries, Generators, Etc. 6
Boats, Inboard & Outboard Motors 11
Body-Building Courses, Jiu Jitsu, Etc. 12
Books & Magazines 23
Business Opportunities 37
Buy It Wholesale 38A

Camping Equipment & Tents 16
Coins & Currency 26
Contests 46

Detectives 47
Do-It-Yourself 66
Dogs, Birds, Hamsters & Pets 17

Earthworms, Crickets, Frogs 18
Educational & Instruction 45
Electric Trains 64B
Electrical Supplies & Equipment 7
Employment Information 42
Engines, Motors, Etc. 10

Farms, Other Real Estate 19
Field Glasses, Telescopes 14
For Inventors 60
For Sale Miscellaneous 71
For the Home 69
Formulas, Plans, Etc. 39

Gifts 49
Government Surplus 11A

High-grade Salesmen 44
Hobbies, Collections 31
Home Craftsman 65

Import-Export 38B
Inventions Wanted 61

Jokes, Games, Novelties, Etc. 24

Loans By Mail 80B

Machinery, Tool Supplies, Etc. 9
Magic Tricks, Puzzles, Etc. 25
Minerals & Precious Stones 30
Miscellaneous 79
Models, Model Supplies 64
Moneymaking Opportunities 38
Motion Pictures & Color Slides 33
Motorcycles, Bicycles & Supplies 4
Musical Instruments and Song Writers 35

Of Interest To Women 70
Old Gold, Jewelry, Watches 67

Personal 80
Phonograph Records 35A
Photo Finishing, Photocopies, Etc. 32
Plastics 40
Printing, Multigraphing, Etc. 57
Printing Outfits, Supplies 58
Profitable Occupations 22

Radio, TV, Electronics, Hi-Fi 36
Razor Blade Shavers 74
Remailing Service 80A
Rubber Stamps & Office Supplies 56

Science & Chemistry 41
Special Services 51
Sporting Goods, Guns, Fishing Tackle, Etc. 15
Stamp Collecting 28

Treasure Finders & Geiger Counters 77

Wanted to Buy 72
Watch Repairing 78
Welding, Soldering 8

PARTS Model "A." List 25c (Refundable) Matco, Box 135, San Pedro, Calif.

RELEASER for Automatic Choke. Improves gas mileage, starting. Not a Conversion. $5.00 Postpaid. Hayes Manufacturing Company, Box 7631, Baltimore, Maryland 21207.

SPINNING. Snow. Stuck. Stranded! Newly invented Snomat arches snugly against spinning wheel—out of snow you go. Moneyback guarantee. Prepare now. Send $1.50 (postpaid). Snomat, Box 617-B, Franklin, Michigan.

SNO-DRIVES® uses centrifugal force of wheels for traction and stabilizing. Results: Sno-Drives win all ice races entered. Install on wheel lugbolts, under wheel covers. $10.95 Postpaid. Moneyback guarantee. Bateson, Inc., 4408 Market, Wilmington, Delaware.

ADD an Ignition Glow Gage $2.00 pp. Q-Arc, Box 47876, Los Angeles, Calif. 90047.

3 AUTO TRAILERS

PICKUP Campers, Pre-cut Kits. Blueprints Supplies Literature 10c. Comstock Trailers, Parsons 5, Kansas.

PICKUP Camper, Trailer Or Pickup-Cover—Build Yourself, Save! Complete plans $3.95 each. Bus Conversion (and Houseboat Interiors) Drawings $2.95. Equipment Catalog $1.00 (refundable). Satisfaction guaranteed. Details 10c. Viking Camper Supply, 94-J Glenwood, Minneapolis, Minn. 55403.

TRAILERS, Parts. Scooters. Wholesale Catalog, 25c. Loren Products, Danville, Illinois.

4 MOTORCYCLES, BICYCLES AND SUPPLIES

KART#6, Minibike Frames $7, less engines. Engines $5 up. Whizzer $15. Three Wheeled Motorscooter $30. Kart $20. Volkswagen Chassis $75. (Mailorder only.) Send 25c. (35c for First Class Mailing) for Directory-Catalogue number 126, listing these and hundreds of other Bargains. Homebuilders Parts, plans, etc. Midget Motors Directory, Athens, Ohio.

RECONDITIONED Motorcycle Motors. Large Stock. Indian, Cushman, Vespa, Mustang, Royal Enfield. Parts. Indian Motorcycle Sales, Kansas City, Missouri 64127.

CONVERT Bicycle to Motorbike! Plans .... $1.00: Go-Byk Industries, Rothsay, Minnesota 56579.

5 AVIATION

WORLD Wide Publisher Distributor of Aviation Space Books. Free 48-page catalog, Aero Publishers, 329 PS Aviation Rd., Fallbrook, Calif. 92028.

Urheberrechtlich geschütztes Material

HOT Air Balloon kit 10'. $4.00 postpaid, complete. U. S. Sportcraft. Box 847. Woodland Hills. California.

FLY over traffic with real homebuilt helicopter. Hover. Uses outboard motor, automobile, motorcycle parts. Explanations, detailed drawings, instructions. $2.00. Helicopters, Box 1117. Leesburg. Florida.

AIRBOAT—Snowplane propellers, plans, kits, supplies. Gauges, throttles, spark plugs, gas-pil hose, oil coolers, primers, wrenches, switches, Tachometers, propeller hubs, engine mounts, conversion parts, fittings. 125-190 Lycoming engines, manuals, gaskets, parts. Catalog 25c. Banks-Maxwell, Box 3301G, Ft. Worth, Texas 76105.

5A ASTRONAUTICS

ROCKETS: New Illustrated Catalogue 25c. Single and Multi-stage Kits. Cones, Engines, Launchers, Trackers. Technical Information, etc. Fast Service. Estes Industries. Penrose 32. Colorado.

6 BATTERIES, GENERATORS, ETC.

COMPLETE Rebuilding Manuals: Batteries $3.00. Hydraulic Jacks $3.00. Satisfaction guaranteed. Bayer Publications, 938 Betty Avenue. Neenah. Wisconsin.

7 ELECTRICAL SUPPLIES & EQUIPMENT

ELECTROPLATING Equipment And Supplies Send $1. Refundable. For Formulas. Equipment Guide. Operating Data And Catalog. HBS Equipment Division, Dept. N7. 3543 East 16th. Los Angeles, Calif. 90023.

REPLACE low output generator with new permanent magnet alternator 12v 35 amp. Kit complete with accessories. Easy installation Factory warranty Price $39.95 Postpaid. Money order to Itonra, PO Box 1412. Beverly Hills. California.

100 FOOT 2 Conductor Lamp Cord or Speaker Wire (specify) $1.00. Bargains galore. Free catalog. ElectriCity. P.O. Box 4. Plainview. N.Y. 11803.

AUTOMATIC Washer repairs manuals on ABC, General Electric, Hotpoint, Hamilton, Kenmore, RCA Whirlpool, Maytag, Westinghouse, Frigidaire, Kelvinator, Speed Queen. $2.50 each ppd. Refrigeration parts catalog 50c. Major Appliance. 13106-12 Caine Ave., Cleveland, Ohio 44105.

8 WELDING, SOLDERING

WELDERS—110-220 150 Amperes $49.50. Morris. 1070 Inner. Schenectady. N. Y. 12303.

FREE Catalog. Welders. Kits. 400-ampere welder from aircraft generator—Plans 35c. Dunbar. Chaska. Minnesota.

ACETYLENE Welding Outfits. New $69.50; Used $50.00; Arcwelders. Eagle Welding. Dept. 42. 5085 Broadway. Chicago. Illinois 60640.

save money on
CARS & TRUCKS
LEARN HOW YOU CAN SAVE HUNDREDS OF DOLLARS THRU WHOLESALE TRADING POST!

FREE at no obligation whatever, we'll send you full details of how you can buy any make or model car or truck; how easy financing & delivery to your door can be arranged; how you can actually save hundreds of dollars on exactly the same car you'd buy elsewhere.

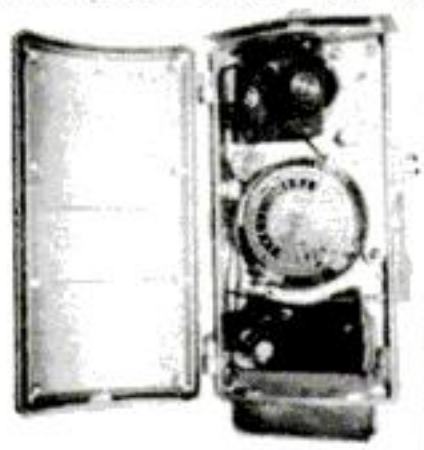
NAME _____
STREET _____
CITY _____ STATE _____
Mail coupon now! Write: Dept. A52
WHOLESALE TRADING POST
Great Neck, New York 11021

MAKE Any Car ROAR Like a LION!
The LOUDEST Auto Horn Made...
deft control lets it roar, or bellow like an angry bull, or whisper gently. $15.95, 6 for $13 ea. Write for our Auto Catalog.
COUNTRY CLUB AUTOMOTIVE
614 Manufacturers Exchange, Kansas City, Mo. 64105

AERO-BIKE CONTROL STICK
New aeronautical type balancing and steering accessory for bicycles. Fits any standard handlebar. Easily installed. Finest materials. Chrome plated. Complete for $3.35 postpaid in USA. Or send 10¢ postage for colorful explanatory brochure.

Aero-Bike Products Co.
Box 342, Muskegon, Mich.

The Miracle CLOCK SWITCH *with a Computer*
which makes automatic daily correction for seasonal change in length of days.
IDEAL FOR SIGNS, STORE, HOME
Turns lights or any appliance ON at sunset, OFF at predetermined time, or sunrise, automatically every day of the year.



115V.60cy.
SWITCHES
1800W.
$4.95
Check or M.O.
P.P. & Hndlg.
Add 75¢

LIGHTS DISCOURAGE PROWLERS
You return after dark to a lighted house, without wasting electricity before sunset. Mfg. by G.E. to rigid N.Y.C. specifications for quality and long life rather than competition price. Used by city to operate street lights. Aluminum housing and door.
COST N. Y. C. MANY TIMES THIS
low surplus price—Guaranteed
E & B SURPLUS
1801 Hylan Blvd., Dept. PS2
Staten Island, New York 10305

Magnetic chuck V Blocks & Parallels, Edge Finders, Center Finders, Thread Measuring Wires, Sine Bars. Hi-Precision—First Quality—Low Prices. Factory Distributors wanted. Be the dealer in your locality. Buy for yourself and sell to others. Liberal discount, products guaranteed. Est. 1943. Write for brochures. **FISHER MACHINE, 11704 Inglewood, Hawthorne, Calif.**

9 MACHINERY, TOOL SUPPLIES, ETC.

UNIQUE Tools: $1.00. $5.95. Stahl Mfg., 3166 Wadsworth. Saginaw. Mich.

HARD-To-Find Tools. Superb quality. Catalog 10c. Brookstone. Worthington 25. Massachusetts.

TAP Drill Chart 50c. Harrison, 1456 W. Larpenteur. St. Paul, Minnesota 55113.

"SMALL Shop Supplies." Production-hobby. Machinist Tools. 1424 Barclay. Springfield. Ohio 45505.

10 ENGINES, MOTORS, ETC.

REWIND car generator for 110 V.A.C. power plant. Plans $1.00. R. Schmauss, 1228 E. Cass St., Tampa, Florida.

REWIND Motors yourself. Complete instructions $1.00. Lewis Manufacturing. Howell 11, Michigan.

11 BOATS, INBOARD & OUTBOARD MOTORS

BOAT Plans, frame kits, full size patterns all prepared specially for amateurs. Send 50c for new catalog illustrating 55 proven designs including sail, inboards and outboards from 7' to 28'. Glen Marine. 9152 Rosecrans. Bellflower. Calif.

FULL size, cut-to-shape boat patterns, blueprints. Send 50c for big New illustrated "Build a Boat" catalog includes Fishing Boats, Garvies, Cruisers, Catamarans, Houseboats—Outboards, Inboards. Sailboats—7½ to 38'. "How to build a Boat" booklet $2.50. Cleveland Boat Blueprint Co., Box 18250. Cleveland, Ohio.

NEW, used, rebuilt marine motors. Marine conversions, fittings. Free Catalog. Stokes Marine Supply, Dept. 23, Coldwater, Mich.

"BOAT Plans," Fiberglass, Resin, Foam, Silicon Bronze Screws Prepaid. (No sales tax). Free catalog. Stiles, 11-S Mantua Heights. New Jersey.

WORLD'S finest boat kits, frame kits, models from 8 to 24 feet—prams—skiffs—runabouts—cruisers—all leaders in styling and performance. Send 50 cents for catalog—$1.00 for catalog plus boat building handbook. Custom Boat Designs. 1709 Niagara St., Buffalo. N.Y. 14207.

200 BOAT designs, patterns, kits. Catalogs. Powerboat $1.00. Condensed 50c, sailboat 40c. Marinecraft. Box 161-P. Brighton 35. Mass.

BOAT Plans—world's largest selection, frame kits and full size paper patterns—designs for the amateur—over 200 proven designs from all over the world—fishing boats—cruisers—sailing—inboard and outboard hydroplanes. Send $1.50 for catalog—$2.00 for catalog plus boat building handbook. Custom Boat Designs. 1709 Niagara St., Buffalo. N.Y. 14207.

11A GOVERNMENT SURPLUS

WAR Surplus Bargain Catalogue. Illustrated Generators, Blowers, Pumps, Gearboxes, Hydraulics, Winches, Motors, etc. Send 50c. Refundable on first order. Surplus Trader, Box 8 TFPS. Thomasville. Penna.

CHEEP Jeeps. Buy from Gov't. Full information 25c. Box 789PSTF. York. Pa.

WAR Surplus Catalogue. Generators, Pumps, Gearboxes, Hydraulics, Winches, Motors. 25c stamps or coin. Trader, Box 8 PSTF. Thomasville. Penna.

JEEPS from $53.90 . . . Trucks from $78.40 . . . Boats, Typewriters, Airplanes, Sporting Equipment. 100,000 Bargains "as is" Direct From Government in Your Area. Complete Sales Directory and Surplus Catalog $1.00 (Deductible First $10.00 Order). Surplus Service, Box 820-B. Holland. Michigan.

GOVERNMENT Surplus Jeeps: How to buy in your area and 400 item Surplus Catalog $1.00. Quality Surplus, Box 22038 P12. Indianapolis. Indiana.

GOVERNMENT Surplus. How and Where To Buy In Your Area. Send $1.00. PS Surplus Information. Headquarters Building. Washington 6, D.C.

JEEPS $62.50 . . Autos . . Boats . . Thousands others available direct from Government! Free Exciting Details! Global. Box 18216-EL. Indianapolis. Indiana 46218.

Urheberrechtlich geschütztes Material

LATEST Facts concerning Government Surplus Bargains. Send dime or stamped envelope. Box 1563PS. York, Penna.

JEEPS — Typewriters—Walkie-Talkies—Guns — Boats — Binoculars direct from Govt. for 2 or 3c on the dollar. Exciting details Free. Box 52PS. Thomasville, Penna.

JEEPS From—$52.50. Typewriters From $4.15. Cars From—$31.50. Walkie-Talkies. Guns. Airplanes. Boats. Typical "As Is" Bid Bargains from Uncle Sam. Tremendous Variety. Exciting Free List. Enterprises. Box 402-S5. Jamaica. New York 11430.

12 BODY-BUILDING COURSES JIU JITSU & ATHLETIC EQUIPMENT

"GIANT Arms." Dr. Young's D. C. Revolutionary discovery. $2. Satisfaction or refund. Gaucho. Box 9309-S6. Chicago 90.

BUILD Muscles Fast! Free brochure! Universal Bodybuilding. Box 4327-B Northeastern. Dearborn. Michigan.

"175 POUND" barbell kit $12.95 Postpaid. Moneyback guarantee. Littlefield Company. 1924 Twentieth. Chickasha. Oklahoma.

MOST Complete book on Karate. "This Is Karate". Masatatsu Oyama. 368 pages. Over 1600 illustrations. $15.35. Catalog of self-defense books 15c. Combat Sports Service. Box 482A. Worcester. Mass. 01601.

APPEAR Taller! Free details! Stature-PS2. Box 10. Brooklyn 7. New York.

KARATE—Free details. Bales Co.. Box 5050. Route 2-K. P.S.. Escondido. Calif.

KASHI-NO-BO. Defensive oriental art of KARATE with a stick. KASH-NO-BO stick. instructions. diagrams. $1.00. Shepherd. Box 946. Birmingham. Ala. 35201.

14 FIELD GLASSES, TELESCOPES

FREE Catalogue! Thousands war surplus optical bargains. Lenses. Prisms. Telescopes. Binoculars. etc. Jaegers. 691G Merrick Road. Lynbrook. New York.

SCIENCE Bargains! Lenses. Telescopes. binoculars. microscopes. kits. parts. war surplus. Send $1.00 for beginner's 10-lens kit with instruction booklet. Order Stock 2-CN. Request Free 148-page Catalog CN. Edmund Scientific Co.. Barrington. New Jersey.

ASTRONOMICAL books. Star—Atlases. free list. Herbert Luft. Box 91. Flushing 64. N. Y.

BINOCULAR Sale! Free color catalog 100 models $9.95-$250.00. Write. United. 9043 So. Western BCAT-8416. Chicago 60620.

Build Your Own Reflector Telescopes. Complete Kits: Mirrors. Eyepieces. Tripods. All other Accessories. Request Free Illustrated Literature. Criterion Manufacturing. Dept. KP-33. Hartford. Connecticut.

UPCO. P. O. Box 187. Sunbury. Penna. Precision Optics. telescopes. mirrors. Price list and brochure available.

BINOCULARS Direct from Manufacturer. Finest Quality. Tremendous Savings! Request Catalog. Koyu. 3860 Crenshaw Blvd.. Los Angeles. California.

15 SPORTING GOODS, GUNS, FISHING TACKLE, ARCHERY, TRAPPING

FREE . . . Wholesale Catalog. Beads. Spinners. Lure Parts. Sinker Molds. Jigs. Reels. Finnysports (PE) Toledo. Ohio 43614.

FREE! Newest edition famous Corcoran catalog. Largest selection hunting. camping. fishing equipment. All items field tested. Boots. clothing. fishing tackle. tents. gun cases. sleeping bags. Dozens of specialties. Corcoran. Dept. PS-125-C. Stoughton. Massachusetts.

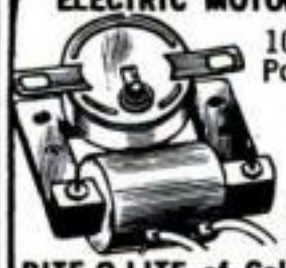
THOUSANDS OF EXCITING TOOL VALUES!

Stanley. Millers Falls. Skil. Disston. Wiss. Dremel. Speedy Sprayers. Plumb. Porter. Channellock. Bonney. Herbrand. Helios. Kennedy Boxes. Huot. Vise Grip. Ridgid and many other Nationally Advertised brands of Tools & Supplies too numerous to mention.

We Ship Coast To Coast At Prices Hard To Beat

Send 25¢ today for our Big 148-page Tool Catalog. **SILVO HARDWARE CO., Dept. PSD. 107 Walnut St., Phila., Pa. 19106.**

ELECTRIC MOTORS 3 for $1.50!



1000 uses for hobbyists! Power turntables, timers, kids' erector sets, model, etc. 4 rpm. 110 volt used. Pretested, money-back guarantee! $1.50 plus 50c pstg. & hdlg. (No C.O.D.'s)

RITE-O-LITE of Calif., Inc.
308 E. Washington, Los Angeles 15, Calif

Scientific method builds

Powerful Muscles

in 3 minutes a day

An entirely new, tested method of muscle-building that combines isotonic and isometric contraction has been developed by physiologists at the famed Max Planck Institute in West Germany. The unique Tensolator method was successfully used to train the German Olympic team and other champion athletes all over the world. A quick series of 7-second exercises positively strengthens each set of muscles without tedious, strenuous workouts. 3 to 5 minutes a day is all it takes for maximum results (guaranteed or money back). The Tensolator method builds powerful muscles, broadens shoulders, trims waist, increases lung capacity. FREE lavishly illustrated, step-by-step brochure shows you how Tensolator works for men 20, 40, 50 years old or more. Send 20c for postage in coin or stamps to Dept. PS-3, Thoylo Corp., 509 Fifth Ave., New York, N.Y. 10017. (Christmas hint: Tensolator makes the gift of a lifetime!)

FISHERMEN! New Transistorized TR-Sonic Fish Call Now Available. Only $12.95. Southwest Sports Products, 10827 Bazin, Houston, Texas 77034.

UNDERWATER Fuse 3/32" diameter 40 feet with plans, formulas, instructions. $1.00 Postpaid. 100 feet $2.00. Wayno, Box 182-B, Addison, Mich.

TR-SONIC Fish Call $6.50. Baylor's, 5235 Cumberland, Chicago, Illinois 60656.

FREE! "How to Buy Snowshoes—Walk Over Snow With Ease". Amazing Bargains! Snowshoes. Box 88-S. Wadena, Minnesota 56482.

ALTER Jap rifles to 30-06 or 257—$6.00. General Gunsmithing Catalog 15c. T P Shop. West Branch 10. Mich.

16 CAMPING EQUIPMENT & TENTS

CAMPING Equipment. unusual selection. Morsan's own quality Tents (200 Styles) finer fabrics; Sleeping Bags (80 styles), every camping convenience imaginable. Free giant Catalogue-Guide-Handbook. Morsan. 819-G Route 17. Paramus. New Jersey.

17 DOGS, BIRDS, HAMSTERS, RABBITS & PETS

RAISE Rabbits on $500 month plan. Free details. White's Rabbitry. Mt. Vernon. Ohio.

GUARANTEED Hunting Hounds. reasonable. Catalog 10c. Clayco Kennels. Henrietta. Texas.

LIVE Seahorses. marine specimens-aquarium supplies. Illustrated catalog 15c. Marine. Box 248-107. Dania. Florida.

MONKEYS $10.00. Mammals. birds. reptiles. Confidential wholesale list $1.00. Dale Logston. Box 682. Saint Joseph. Missouri 64502.

EARN $10.000 yearly raising Angora Rabbit Wool for us. Information 25c coin. American Angora Company. Malta 1. Montana.

18 EARTHWORMS, CRICKETS, FROGS

RED Wigglers: Select breeders or fishing size $3.50—1.000. $14.25—5.000; bed-run $9.95—10.000. Postpaid. Free folder "Growing Fishbait." Fain's Bait Farm. Box 56A. Edison. Georgia.

EARN Money raising fishworms for us! Exciting details free! Oakhaven-121. Cedar Hill. Texas.

FREE Literature—We teach you how to raise. sell fishworms. crickets. Hybrid red-worms 3000—$5.95. 5000—$8.95. 10.000—$16.95. Postpaid. Carter Farm-12. Plains. Georgia.

MEN! WOMEN! Make money raising Bait. We buy your crop! Wigglers. Warsaw 3. Indiana 46580.

19 FARMS, OTHER REAL ESTATE

ABANDONED Timber Leaselands! Choice 640 acre Sportsmen's paradises still available—$20.00 plus $6.50 Taxes yearly. Maps. pictures. $1.00 (Refundable). Director. Erindale 3. Ontario. Canada.

CANADIAN Vacation Lands: Full price $385.00. 40 acres. $10 month. Suitable cottage sites. hunting. fishing. investment. Free information. Land Corporation. 3768-D Bathurst. Downsview. Ontario. Canada.

FLORIDA Campsites—deep in the heart of the great Ocala National Forest. Good hunting and fishing. Free maps and Photos. Winfree Vernor. DeLand. Florida. AD646369D.

$1 Acre — Canadian Border — Hundreds campsites. islands. farmlands. directly from Tax Authorities. (Non-profit). Lists. photographs mailed. Register. Room 204. 92 King St. E.. Toronto 1. Canada.

400.000.000 ACRES government public land in 25 states. Some low as $1.00 acre. 1965 report. Send $1.00 National Land. 422PS12 Washington Building. Washington. D.C.

FLORIDA Water Wonderland—Home. Cottage. Mobilsites. Established area. $590 full price. $9.00 a month. Swimming. fishing. boating. Write: Lake Weir. Box HA 38. Silver Springs. Florida. AD 6-1070 (F-1).

FREE!—Fall-Winter Catalog. Big. 180 pages! Selected Best thruout the U. S. Thousands of properties described. pictured—Land. farms. homes. businesses. —Recreation. Retirement. 490 offices. 35 states coast to coast. World's Largest. Mailed Free! Strout Realty. 50-ZB E. 42nd St.. NY. NY. 10017. 7 ZB S. Dearborn St.. Chi.. Ill.. 60603. 521-ZB E. Green St.. Pasadena. Calif. 91101.

BUY without risk for Retirement. Vacation. or Investment—under America's only "No-Risk Purchase Plan" in Carolina Coast multi-million dollar. 14.000 acre development. 10 year money back guarantee. Payments less than $5.00 monthly. Shopping Center. Motel. Hunting. Fishing. Golf. Country Club. right on property. Private ocean beach. Write for free literature. Boiling Spring Lakes. Southport 2-M North Carolina. 28461.

Urheberrechtlich geschütztes Material

"CAL-ORE Ranches" in Oregon's Rogue River Valley near Medford and Grants Pass. $2995 to $5995. Pay $150 down, $35 monthly. Free catalog. Cal-Ore Ranches, 1054PS South Riverside, Medford, Oregon.

FREE! 152-page catalog! Over 1700 Pictures! Farms, Ranches, Homes, Businesses, Vacation and Retirement Properties in 28 States coast to coast! United Farm Agency, 612-PS West 47th St., Kansas City, Mo. 64112.

22 PROFITABLE OCCUPATIONS

MAKE Money Writing Short Paragraphs. Information Free. Barrett, Dept. C-86-HB, 6216 N. Clark, Chicago 26.

AUCTIONEERING—Resident and Home Study Courses. Diploma granted. Auction School, Ft. Smith, Ark.

INVESTIGATE Accidents. Earn $750 to $1,400 monthly. Car furnished. Expenses paid. No selling. No college education necessary. Pick own job location. Investigate full time. Or earn $8.44 hour spare time. Men urgently needed now! Write for Free Book. Absolutely no obligation. Universal, CPS-12, 6801 Hillcrest, Dallas 5, Texas.

BECOME independent with your own franchise business. Thousands earning handsome incomes. Request interesting facts today. National Franchise Reports, F-528, 333 North Michigan, Chicago 1.

INVESTIGATE Fires, Storm Damage, Accidents for Insurance Companies—pays up to $1,000 a month, part or full time. No college necessary. Car furnished; expenses paid. We train you at home in spare time. Keep present job until ready to switch. Pick your location. Men badly needed now. Full information Free. Write Liberty School, Dept. C-110, 1139 W. Park, Libertyville, Illinois.

VENDING Machines—No Selling. Operate A Route of Coin Machines and Earn Amazing Profits 32-page Catalog Free. Parkway Machine Corporation, 715PSP Ensor Street, Baltimore 2, Maryland.

SHARPEN—Scissors, pinkers, tools. Inexpensive equipment, supplies. Blackhawk, Sheldahl, Iowa.

FREE Literature—Make Big Money Raising Fishworms and Crickets. Carter Farm-10, Plains, Ga.

FREE Book "990 Successful, Little-Known Businesses." Work home! Plymouth-85P, Brooklyn, New York 11218.

23 BOOKS & MAGAZINES

HISTORICAL-Genealogical-Biographical monthly magazine 35c. CS Box 746, Burlington, Vermont.

FREE Catalog unusual books. Murry Company, Dept. 265, 3000 Truman, Kansas City, Mo. 64127.

BOOKHUNTERS: All Subjects. Send Wants! Sydney Jaher, 175-45 88 Ave., Jamaica, N. Y. 11432.

ATHIEST, intellectual, scientific, research books. Free Catalog. Truth Seeker, Box 2832, San Diego, Calif. 92112.

BOOKS—Thousands of Titles—15c Each and Up. Catalogs—10c. Midwest Mail Sales, 216-F West Jackson, Chicago, Illinois 60606.

ALASKA! Learn about the frontier state! Five back issues. Interesting, illustrated Alaska Sportsman magazine $1.00 postpaid. Twelve for $2.00. Alaska Specialties, Ketchikan, Alaska.

BOOKHUNTERS! Send Wants! Atlantic Book Service, 10 Cedar, Charleston 29, Mass.

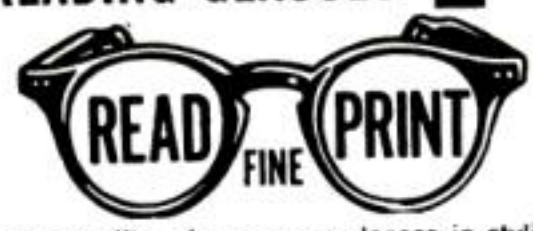
OLD & new books supplied! Monson, 4524 Montview, Denver 7, Colorado.

SEND Two 5c Stamps for descriptive list. Frank Deisz, 8820 N Lombard, Portland, Oregon 97203.

French Canada Calling

FIVE Assorted very Funny Joke Books only $1.00. Guaranteed to please. Box 296, Snowdon, Montreal, Canada.

MAGNIFYING READING GLASSES $2.98



High-quality, plano-convex lenses in stylish smoke-color frames magnify fine print, make it easier to do close, precision work. Metal hinges for long wear. For folks over 40 without eye disease or astigmatism who simply need magnifying lenses. If not satisfied, return postpaid within 30 days for full refund. An outstanding value at $2.98. Add 25c postage. State age, sex. **NEL-KING PROD., Dept. PS 25G, 811 Wyandotte, Kansas City, Missouri 64105.**

MAKE $$

Sell Tiger Motor Bike Kits $49.95 + $5 Shipping & Crating Charge. Guaranteed & serviced nationally, fits all bikes. Send $1 for plans, photos, brochure & selling plan. $.25 for brochure & selling plan only.

TIGER INDUSTRIES
Box 413, PS3
Laguna Beach, Calif.

PEDOMETER

Measures the miles as you walk. Ideal for sportsmen, scouts, etc. $2.00 P.P.

CHARLES ANDREWS CO.
2466F HOLTON, ST. PAUL, MINN.

SLUMBER MATTRESS
For Camping and Fishing Trips!
Full size air mattress built to military specifications. Inflates to 24" x 74"; weight only 2¾ lbs! Extremely durable—Highly resistant DuPont Nylon fabric is double rubber coated for perfect air seal. Easily inflated with pump or mouth.
Brand new—low price due to minor imperfections repaired and pressure tested by factory. Each pp $4.95, 2 for $9.00.
RUBBER FABRICATORS
GRANTSVILLE, WEST VA.

MONEY IN WORMS

SUCCESS for You! Raise Fishworms and Crickets. Write for FREE literature and our Success Story in LIFE Magazine. Let us teach you our Secrets of Success.
Carter Worm Farm-15, Plains, Georgia

FREE
72 ROUNDS OF BLANK CARTRIDGES

ITALIAN
SNUB NOSE
AUTOMATIC

$4.98

Identical duplicate in styling of automatic detective revolver. Fires 12—4.5 cal. blank cartridges in 10 seconds. Not a CO_2 or Pellet gun.

FREE—72 rounds of blank cartridges included. Perfect for sports, stage, etc.

Illustrated gift carton.

Postpaid. Send cash, check or M.O. No COD's please.

FEDERAL
6652 N. Western/Chicago, Ill. 60645
Dept. GP

24 JOKES, GAMES, NOVELTIES, ETC.

GAMES Inventors! We are interested in new and novel child and adult game ideas. Nationally-known game manufacturing and marketing firm. Send for details. Hagglund and Associates Research. Dept. B, 650 Ottawa Ave. N., Minneapolis 22, Minnesota.

FREE Catalog—Tricks, Jokes, Funny Cards—50 samples 25c. Dohn-3L-Marks, Broadview, Illinois.

25 MAGIC TRICKS, PUZZLES, ETC.

WORLD'S finest professional magic Joker novelties, Giant illustrated catalog 10c. Top Hat, Evanston 13, Illinois.

164 PAGE Giant Deluxe Top Secret Catalog Handbook! 1,000 World's Greatest Tricks! Illustrated! Sensational! 10c complete! Vick Lawston's Magic! Dept. PS65, 4018 N.E. Fifth Ave., Ft. Lauderdale, Florida.

FUN 'n Magic Catalog 10c. (1,500,000 tricks, jokes, novelties, puzzles, disguises, books). Elbee, 7408-J. San Antonio, Texas. 78207.

NEW Edition, 1965 Catalog. 500 Tricks, only 10c. Fastest same-day service to magicians for 40 years. Send 10c today. Douglas Magicland, Dept. 22, Dallas, Texas.

MAGIC Catalog World's Finest. 3000 Tricks, 408 Pages, $2.50. Beginners, Amateurs, Professionals. Kanter's, A-200 S. 13th St., Philadelphia, Pa. 19107.

BE A Magician! Two booklets explaining sixty-eight tricks plus large professional catalog. $1.00. Magic Inc., 5080 Lincoln, Chicago, Illinois 60625.

COMPLETELY illustrated 84 Page Catalogs, 25c. Manhattan Magic, Box 334-S, N.Y.C. 11.

GIANT Magic Catalog and free trick only 10c. Write today. Mailmart, S1265 Box 616, White Plains, N. Y. 10602.

FREE magic catalog. Houdini sensational escapes, handcuffs. Stage illusions. Magic, Jokes. Write today. Heaney Famous Magician, Oshkosh, Wisconsin 54902.

26 COINS & CURRENCY

CIVIL War Specials: 1863 Cent, $1.75; 1863 Civil War Token, $1.75; 1864 Genuine Confederate States of America $10.00 Bill, $2.00. All three $5.00. Rarcoa, 31-A North Clark, Chicago 60602.

INDIAN Cents, 12 different, $2.00. Free Price List. USCO, Box 638, Amityville, New York.

25 DIFFERENT coins from 25 foreign countries. $1.00 bargain, Hindley, Box 708, Aurora, Illinois.

COIN Magazine, 200 pages. Sample 50c. Numismatic, 7320 Milwaukee, Chicago 31.

100 Foreign notes $3.95. 8 different Mexico silver dollars $3.95. 5 Formosa Silver Dollars—$2.95. 100 Foreign notes $3.95. Casted, Box 276, Tolleson, Arizona. 85353.

BARGAIN List Coins, Supplies, 25c. Free Magnifier. C.C.C.C., Conover, N. C.

NEW transistor instrument detects buried coins, gold, treasures, metals. Free information. Relco-C41, Box 10563, Houston 18, Texas.

TRUNKFUL 25,000 Indian-Lincoln cents mixed (from the 1920's & older). Will pack "Grab-Bag" style. 400 mixed—$25.00. Sample bag of 20—$2.00. Mrs. Fischer, Box 5490, Sherman Oaks 66, Calif.

COIN Date Guaranteed. Restores Dates On Worn Nickels $1.00 Per Bottle. Box 276-P, Morresville, N. C.

10 DIFFERENT Indian Cents $1.90. Lists 5c. Ace, Jamesburg, N.J.

120 PAGE catalog foreign coins-bills-20c. Jolie, Roslyn Heights, N.Y. 11577.

LINCOLNS: 22 Different "S" including rare 1955S, $1.60. 28 different before 1940, plus odd 1960D small date, $1.60. 10 different "S" Jefferson nickels, $1.60. All three $4.50. Harris, Box 1147-G, Oceanside, California.

Urheberrechtlich geschütztes Material

"10 DIFFERENT Indian Cents plus 5 Foreign coins . . . $2.50. Kottke's, Box 428, Mankato, Minn."

1966 CATALOG Now Ready. 50¢ with Refunding Certificate. Hobby Sales, St. Paul, Minnesota 55116.

FREE Coin Supplies, Giant Coin list 10c (refundable). Economy Sales, Mansfield, Massachusetts.

GIGANTIC Coin Clearance. Illustrated lists 10c (refundable). Hutchinson's, Box 6256, Philadelphia, Pa. 19136.

HOW to pyramid $5 into $10,000 in less than ten years, in a special situation in Silver Coins. Guaranteed information $1.00. E & O Publishers, Dept. 12, Box 4037, Dallas, Texas 75208.

SPECIALS! Ten Indians before 1890 $8.50; Five large cents $9.00; Five V-Nickels $1.75; five Morgans: Dimes $2.25; Quarters $3.25; Halves $6.50; All Different 2c Copper $1.90; 3c Nickel $2.00. Nelson, 346-R, Rye, N.Y.

UNCIRCULATED $20.00 Gold pieces $52.50. Pacific Coin, Box 274-PS, Downey, California.

BARGAINS—(All Brilliant Uncirculated): Commemorative $\frac{1}{2}$—Oregon Trail $13.00, Pilgrim $10.50, Texas Centennial $16.50, Stone Mountain $7.75, Carver $2.50, Washington $3.00, $20.00 Gold $59.50, 2 different types $112.50, Gigantic Bargain Catalogue $1.00. Bebee's Inc., 4514 North 30th, Omaha, Nebraska 68111.

UP to 700% profit. Buy foreign coins direct from world mints at cost: sell to coin collectors by mail order, etc. Over 100 mint addresses, and how to order $1.00. Topham, Box 91, Etobicoke, Ontario, Canada.

40 PAGE illustrated United States and Canadian coin list 10c. Stone, 260 Washington, Boston 8, Mass.

FOR Sale! 30 Lincoln cents before 1941, all different, $2.00. Gene Carlton, Chandler, Okla. 74834.

1955s MINT Set $2.00. List Free. Coins, Box 48, Grandview, Tenn.

SPECIALS on scarce date Lincoln Cents. All are good or better. Your satisfaction guaranteed. 75c each 1921S, 1924S, 1932, 1932D, 1933, $1.00 each 1909VDB, 1913D, 1923S, $1.50 each 1911D, 1912D, $3.00 each 1913S, 1922D, 1931D, 1933D, $4.50 each 1910S, 1915S, 1926S, $5.00 each 1912S, 1914S, $11.00 each 1911S, 1924D. Bryson Inc., 612B White, Toledo 5, Ohio.

COLORFUL Set Free! Worldwide approvals. Gorliz, Drawer 388CS, Park Ridge, Illinois.

U.S. Mint Specials! Flag Set Complete, $1.00; 1c, 2c, 3c Famous Americans (21 different), $1.00. Free list. Brooks, 2601 Avenue "U," Brooklyn 29, N. Y.

702 U.S.A.—25c (plenty commemoratives). Request Approvals. Horace Gatewood, Winston-Salem, N. C.

NUDES set (4)—Unusual Approvals 10c. Atlas, Plainfield, Racine, Wisconsin.

UNITED States commemorative collection containing 33 different—10c. Approvals. White, 516-W Avenue L, Brooklyn 30, New York.

EXCEPTIONAL 125 different, cataloging $3.00. Include triangles, commemoratives, 10c approvals. Reeves, Box 597P, Miami, Florida, 33137.

225 STAMPS For only 10c! This mammoth value includes Airmails, Pictorials; stamps from strange Countries catalouging up to 25c each! Also Approvals. Mystic Stamp Company, Camden 55, N. Y.

PENNY Foreign stamps, neatly mounted in jumbo books in Scott order. Bullot Philatelics, 1454 Coney Is. Ave., Brooklyn 30, N. Y.

AMAZING Offer! 200 U.S. stamps—including commemoratives, airmails, high denominations to $1.00—only 10c to Approval Applicants!! Illustrated Bargain Lists free. Mystic Stamp Co., Dept. 55, Camden, New York.

LINCOLN CENTS

SCARCE DATES

1917D, 17S, 18D, 18S, 19D, 20D, 20S, 25D, 25S, 26D, 27D, 28D, 29D, 29S, 30D, 30S, 34D, 35D, 35S, 36D, 36S, 37D, 37S, 39S, 42S, 48S, 49S, 54P, 54S.

FOR SALE at 15¢ each.

TIPSICO COIN CO.

6837 Kiami St., Tucson, Arizona 85715

WORLDWIDE. 50 all dicerent, absolutely free—just to introduce our incomparable approvals. Kent Stamp Company, GPO Box 87, Brooklyn, N. Y.

25 Different U.S. Commemoratives 1893 Up 10c. Approvals. K&B Stamp Co., Box 70, Bklyn 23, N. Y.

215 DIFFERENT U.S. Commemoratives $1.00. Approvals. H. Holub, 18 East 198th St., Bronx, N. Y. 10468.

80 DIFFERENT U. S. Stamps. Includes 1943 Flag Stamp of occupied Nations. Only 25c. Approvals included. Willett Co., Box 538-Y, Yorktown Heights, N. Y. 10598.

FIPEX — Tipex — Cipex — Ashville Four miniature sheets used for $1.00 if you ask for our bargain priced U. S. approvals. Triboro, 38 Park Row, N. Y., N. Y. 10038.

INVERTED Error—Dag Hammarskjold 5c with approvals. Belmont Stamps, Washington, D.C. 20015.

50 YEARS Old, fifteen different United States, over fifty years old—10¢ with approvals Jaxon, Box 145-S, Brooklyn, New York 11230.

WOW! 1,000 Different Worldwide-Valued over $20.00 only $1.00 with quality approvals. Universal, Box 6, Kenosha 6, Wisconsin 53141.

FREE, 121 different Flag—Stamps—Approvals. W-B Stamps, Wilkes-Barre, Pa.

OLD scarce U.S. seconds on approval. Slightly defective, bargain prices. Hearnfeld, Box 318, Irvington, N. J. 07111.

DEALER'S Wholesale Catalog. Postage 5c. Franksco, 5031 Queensberry, Baltimore, Maryland 21215.

FREE!! Congo Triangle Set! Boy Scout Beauty! 25 others. Different. Approvals. Cambridge, Box 411, Cambridge, Ohio.

500 DIFFERENT Stamps, $1.00 with approvals. Smith, 508U Brooks, College Station, Texas.

100 OLD U.S. Stamps between 1861 and 1935 $1.00. Rousch Stamps, 51 Chestnut, Mansfield, Ohio.

FREE 400 genuine postage stamps! Worth $10.00 at catalogue prices. Africa—Europe—Asia—British Emp.—a fascinating, valuable mixture from foreign convents, banks, etc. Who knows what you will find. Also free valuable Booklet. Adults only. Approvals enclosed. Frasek Co., PS-12, White Plains, N. Y.

"OLD Glory" in flaming colors! ! ! USA Flag giant beauty from Honduras! Enormous United Nations Mexican Stamp! Plus Strange Gorilla issue, Duke of Windsor, Morocco, lovely Macao bowers, Wild-Buffalo stamp & others. 10c with approvals. Sunny Stamps, Fruitport, 10, Michigan.

AMERICAN Historical Collection! ! Enormous Airmail Diamond! Pres. Kennedy & Movie Star Grace Kelly, 1st USA Spaceman Shepard, plus midget soldier, Latin Orchid issue, old St. Pierre Fisherman, etc. 10c with approvals. Roseland Stamps, Spring Lake 10A, Mich.

FREE U. S. Catalog. Mint SC# 740-9 $2.00, 756-65 $2.10, 859-93 $6.00. Simmy Co., 40 Court, Boston, Massachusetts.

U.S. $$STAMPS Free! Columbus Issue, Pony Express, Antarctic Territory, Beetles, Togo, Kennedy, etc. Send 10c for mailing. Empire Stamp Corp., Dept. PR, Toronto, Canada.

SURPRISE Collection! Exotic mint British Colonials, absolutely free with approvals. Viking, Great Neck 5, N.Y.

SOUVENIR Sheets Czechoslovakia 1937 plus Japan 1947, 10c with Approvals. Kingman, 30 Empire, Yonkers, N.Y. 10704.

WOW! 110 All Different Germany 10c. Commemoratives, Airmails, High Values, Big Catalog, bargain lists plus selections of fine stamps from our approval service. Buy those you wish—return balance. Jamestown Stamp, Dept. A125PS, Jamestown, N.Y. 14701.

CLEARANCE—Forty Different Packets. Only $1.00. Norge Company, Ho-Ho-Kus, New Jersey.

MINT Canada—Free with 2c Approvals. Banks, 81 Withrod, Armdale, N.S., Canada.

ATTRACTIVE—Mint Indonesian Pictorials—plus bargain catalogue featuring U. S. stamps, packets, accessories. 10c with approvals. Bydahl, Box 1293-SL, Seattle, Washington 98111.

FREE! Big Bargain Catalog—New Edition listing thousands of bargains including U.S. & B.N.A. stamps, packets, albums, accessories and supplies. Plus selections of fine stamps from our approval service. Buy those you wish—return balance. Jamestown Stamps, Dept. E125PS, Jamestown, N.Y. 14701.

1500 FOREIGN $1.00. 5,000 $3.00. 5,000 USA-commemoratives, airs, high values, revenues, 19th Century, etc. $3.00. No approvals. Meyers, 5321 Fleming, Richmond, California.

50 DIFFERENT large U. S. commemoratives including commemorative check list 25¢. Request 2-3¢ foreign approvals. Hohmann, 20S. Yacht Club, Treasure Island, Florida.

1¢ SALE—Genuine United States Postage Stamps. 100 Different $1.00. No approvals. C. Marcum, Hopkinsville, Ky.

FREE Surprise Packet with Approvals. Martell, Box 421, Westerly, R. I.

216 DIFFERENT U. S. commemoratives $1.00. (Limit one.) Carstamps, 739 Ordway, Freeport, Illinois.

USA Mint 740-749 $2.00; C25-C31 $3.00. Cooper, Box 3751S, Oak Park, Mich. 48237.

ATTRACTIVE Triangle set free! Request approvals. Cutlass, Box 235, Chicago 60645.

FREE Sample! Interesting, Informative. Illustrated. National Stamp News, Anderson, South Carolina.

40,000 DIFFERENT. Amazing new plan builds your collection systematically, country by country. As low as 50c weekly. Ware, Monroe 70, Conn.

60 DIFFERENT U.S. (30 Commemoratives) 25c. No approvals. Seidenberg, Salem 169, Oregon.

PENNY Approvals! Regardless Catalogue! Kloster 4164—52nd Ct., San Diego 5, California.

UNITED STATES approvals. Select copies, used-mint. Kingsbury, Groton 1, Vt.

500 DIFFERENT stamps $1.00. Approvals. Henderson, 207-S Fulton, Mo. 65251.

TEN different nudes: 20c, approvals. Stamp Farm, 255, Oxford, Wisconsin.

CANADIAN Collection, 10c. Approvals. James Diehr, Box 2615, Los Angeles, Calif.

FREE! 25 Egypt, 10c handling. Approvals. Bellet Stamps, Hazel Park, Michigan 48030.

HUNDRED Different Worldwide Free! Approvals. Martin, Box 218, Tustin, California.

FREE 25 Rockets to new approval applicants. Tiqet, Box 1496, Denver 1, Colorado.

GERMAN Commemoratives, 10c with approvals. Schaefer, Box 1704, Washington 13, D.C.

50 DIFFERENT Old U.S. Revenue Stamps 50c. Winchester Stamps, Box 1592, Mansfield, Ohio 44907.

FREE mint set—approvals accompany. Minteo, Box 22092, Memphis, Tenn. 38122.

FREE! 29 thrilling jet, astronaut rocket, space, airmails. Send 10c handling, 2c approvals included. ABC World, Box 6000-WK, San Francisco, California.

U. S. UNITED Nations, Confederate States. Illustrated Price List Free. Stone, 260 Washington, Boston 8, Mass.

MILLION Foreign Stamps! 2c each! Send for thrilling, giant approvals! ABC, Box 6000-ML, San Francisco 1, California.

FREE Surprise collection sent with approvals. Jay, 1784 Union, San Francisco, 94123.

ENORMOUS variety old U.S. flags, famous Americans, Commemoratives with approvals, surprise packet. 10c handling. Metropolitan Stamps, Box 312 PS, Jackson Heights 72, N. Y.

10 DIFFERENT Presidentials 5c with beautiful US approvals. D & D Stamps, P. O. Box 245, Cape Cottage, Portland, Maine 04107.

U. S. BARGAIN: 50 different 10c with beautiful world-wide approvals. Stamps, Kennebunk, Maine.

GIANT Stamp Collection including: Astronauts, Satellites, Moonrockets, Boy Scout issue, complete U.N. Set, recent Olympics and Sport issues from many countries, etc., Plus Big Stamp Dictionary and Approvals. Everything, 10c. Stampex, Box 47-RP, White Plains, N.Y.

FREE! 25 Norway with bargain approvals. Paul Covert, Box 1202, Dothan, Ala.

$1.00 SPECIALS—1500 Worldwide; 400 U.S. High Value, Airs; 225 U.S. Commemoratives; 200 Old U.S. Steele, Box 242-SP, Colorado Springs, Colorado 80901.

BEAUTIFY and protect your collection from humidity with professional quality mounts. Generous package, singles, blocks, or covers, $1.00. Marlate, Box 156-P, Windsor, Connecticut.

RUSSIAN space set 10c. Russian Approvals, topicals. Snedco, Waldwick, N. J.

FAR African Stamps—twenty-five different for fifteen cents with approvals. Florida Stamps, Washington Arcade, Orlando, Florida.

123 DIFFERENT colorful stamps, 10c. Bargain approvals. Krehl, 1708 Nebraska, Orlando, Fla.

1000 FINE Mixed United States Stamps 25c. Wright's, Box 2122, Hagerstown, Maryland 21741.

U.S. APPROVALS. Low prices. Eagle, 2221 Romine Ave., Pittsburgh 26, Pa.

SENSATIONAL Free Offer: 20 Different Outer Space stamps, selected approvals, Louis Morrison, Folsom, Pa, 19033.

29 ANTIQUES, RELICS & INDIAN GOODS

TONS of Antique Gun Parts and Supplies. All Reproduction Muzzle Loading Guns. Send $1.00 for enlarged illustrated Catalog No. 115. Dixie Gun Works, Union City 13, Tennessee.

ANTIQUE & Modern Military Arms And Equipment. Largest selection of military goods in the East . . . guns, swords, edged weapons, hats, helmets, insignia, uniforms, books, medals and accoutrements. Large, fully illustrated Catalog—$1.00. ZM Military Research Co., Inc., Dept. PS, 80 Nassau St., New York, N.Y. 10038.

SELLING 20,000 Indian Relics, Arrowheads, Spearheads, Etc. List Free. Lear's, Glenwood, Arkansas.

10 GOOD Arrowheads $3.00, Hundred $18.00. List Free. Hyde's, Box 1788, Santa Fe, New Mexico.

RARE in collections. Ten, $1.00. Flint Arrowhead-making secret, ancient illustrated methods. Guaranteed, $1.00. Circulars 25c. Blackhawk, Umatilla 15, Oregon.

30 MINERALS & PRECIOUS STONES

JADE Tie Tack. Rockhound catalog $1.00. Dalley, Box 405A, Driggs, Idaho.

U.S. and Foreign Minerals. Lists 10c. Hartmon, B98, Winston, Mexico 87943.

ROCKHOUNDS — Different Colored Stones from U.S. and Canada. Ground and Highly polished. $1.25 Postpaid. "Rocks," Box 288, South Barre, Vermont.

ROCKHOUNDS—Gem Cutters—Jewelry Makers . . . new Free catalog—just off the press! Biggest supplier to hobbyists and craftsmen offers you tools, materials, equipment, introductory bargains and know-how. Free catalog . . . Write Grieger's, Dept. C-14, 1633 E. Walnut, Pasadena, California.

INSIGNIA ARMY · NAVY · MARINE **40 for $1.25**

Includes 40 Different Shoulder Emblems, Ratings, Chevrons, Q-Bars, Medals, Ribbons, Collar Insignia, etc. ORDER NOW! Send $1.25 for 40 or $5.00 for 200. NO DUPLICATES—ALL DIFFERENT

EMBLEM SALES CO. Dept. PS3
P.O. Box 167 Madison Sq. Sta., N.Y. 10

'65 INDY "500" CLASSIC COLOR FILM

The action, the excitement of the big '65 race for you in full color. See A. J. Foyt, Jim Clark and Parnelli Jones fight it out. 20 minute entertainment. 180' 8mm Eastman color.

Order several now . . . **$12.95** Send check or money order ppd

SPORTLITE "500" FILMS

P.O. Box 24-500, Speedway 24, Ind. Dept. PS

SIX beautiful crystal groups from Mexico $2.00. 40 tumble polished gemstones $2.00 postpaid. Crystals from Africa, Brazil, Italy, etc. Send for free lists. Sering, 1705 E. Michigan, Indianapolis, Indiana.

UNUSUAL Gift—Postpaid anywhere in continental U.S.A. Mineral and rock specimens—extra large and attractively mounted in sturdy box. Includes descriptive folder. 20 for $1.75—36 for $3.00. Castle Rock Specimens, Box 249, Castle Rock, Colorado.

EARTH Science Educational Magazine Subscription $2.50. Sample 35c. Box 550-PS, Downers Grave, Ill. 60515.

31 HOBBIES, COLLECTIONS

INTRODUCTORY Five Military Emblems and Illustrated Catalog, 25c; Foreign Medal, 50c; 10 Military decals 25c. Hobbies, Box 71-M, Rockaway 94, New York.

MODEL Railroader magazine, the "Bible" of the hobby, serving model railroaders over thirty years. Tells you how to get started and how to have more fun with the hobby. Special subcription offer, 7 issues for $2.94. Model Railroader Magazine, 1027 North 7th Street, Milwaukee, Wis. 53233.

MILITARY Miniatures—Largest selection of the finest quality figures in U.S. Catalog 50c. Bussler, Box 107-K, Wollaston, Mass. 02170.

SOLDIERS, tanks, guns. Catalog 50c. Figurines, Box 62, Iberville, Que., Canada.

32 PHOTO FINISHING, PHOTOCOPIES, ETC.

COLOR Movie Fans! 8 MM expertly processed for just $3.10 including fresh Kodachrome Film. All mailed back next day First Class. Craftsmanship guaranteed. Send exposed reel or request Free Mailers and Price List of complete services. Direct Mail Photo, Box 8352-PS, Pittsburgh, Pa. 15218.

PROTECT Your Photos. Snap-shots or Photographs, black and white or colored. Also Identification cards. Sealed in Heavy Plastic Laminate Forever, under heat-pressure. 3½"x6" or less, 50c. Solarek, 1037 Diversey, Chicago.

KODAK Film, Sylvania Flashbulbs, Kodak and Polaroid Cameras. All factory fresh. Lowest Prices anywhere—Save 40% or more. Free Price List. Hallmark, Box 1544, San Jose California.

33 MOTION PICTURES & COLOR SLIDES

8mm. MOVIES, 2"x2" Color Slides—biggest selection anywhere! World's Fair railroad, antique automobiles, circus, World War II, Hollywood classics, travel, wild life and many others. 16mm. new, used films also. Big Blackhawk catalog free. Blackhawk Films, 415 Eastin-Phelan Bldg., Davenport, Iowa 52805.

MOVIE Film! Free catalog! Eso-H, 47th Holly, Kansas City 12, Mo.

16 MM SOUND-Projectors, Films, New, Used for Sale. Free Catalog. National Cinema, 71 Dey Street, New York City, N. Y.

SAVE! Process your own movies at home. Free Catalog. Superior, 442-448 N. Wells, Chicago 10.

FREE Catalogues. 5,000 8-16MM Films. International-S Films, Greenvale, New York.

16MM SOUND Features And Shorts. Bedner, 5300 So. Talman, Chicago.

LADY Wrestling, Movies, Photos. Free List. Peerless, Box 171-P, New York 13, N. Y.

35 MUSICAL INSTRUMENTS AND SONG WRITERS

SONG Ideas Wanted. Write with active, professional songwriters with publisher contacts. Records made. Share royalties. Send ideas—free examination. Songwriters' Associates, 236 W. 55 St., N. Y. 19-G.

POEMS wanted for new songs. Send poems. Crown Music, 49-P West 32, New York 1.

SONGS, SongPoems: Wanted for Radio Show. Hollywood Music Productions, 6425-A-14 Hollywood Boulevard, Hollywood, California 90028.

GUITARS! Lowest prices, best deal in country. Famous brand catalogs free. Universal Guitars, 20 Clent, Great Neck, N.Y.

ACCORDIONS, Guitars, Band Instruments! Save to 50%. Famous makes. Easiest terms. Trades accepted. Free home trial. Free discount catalog. Mention instrument. International Music Mart, 5535-P Belmont, Chicago 60641.

VIOLIN and Guitar makers—send for latest Free Catalogue of woods & accessories. International Violin, PS12, 414 East Baltimore St., Baltimore 2, Md.

INCOME guaranteed two years for songpoems accepted! Free public releases! Castle's, 203-PS West 46th St., New York City 36.

SONGS, Poems Wanted! Accepted songs published, recorded at our expense! Ted Rosen, 17-PS Longwood Road, Quincy, Mass.

GUITAR, Banjo Making, books, plans, wood, necks, tools. List 15c. Wildwood, 510 East 11th Street, New York 9, N. Y.

PLAYER Piano Books. Send for free catalog. Vestal Press, Vestal 8, N. Y. 13850.

POEMS wanted for songs. Royalties. Tin Pan Alley, 1650 Broadway, New York, N.Y. 10019.

GUITARS $11.95. Electric Double Pickups with Tremelo Bar $49.95. Any make on hand. Amplifiers $27.50. Accordions $125.00. Concertina $350.00. Drums, 3-Piece Pearl Set $99.00. Wind Instruments $49.95 up. Write Information. Melody Music, 4951 W. 95th St., Oak Lawn, Ill.

GOOD songs published, recorded, promoted strictly on a 15% commission basis. Free melodies composed to Good Lyrics. Send $3 for 1-year Membership Card. Details. Enclose self-addressed stamped envelope. Songwriter's Co-operative Association, 972PS, Broad Street, Newark 2, N.J.

SONGWRITERS: Protect your ideas! Write for Safe Procedure! We serve Top Hit Writers in N.Y. Dept. P-3, Superior Song Service, 545 Fifth Ave., New York, N.Y. 10017.

FREE Recording, your songpoem. For information, send poems: Musicrest, 12044 Chandler Blvd., North Hollywood, Calif.

Urheberrecht ch geschütztes Mate al

NEW and used Professional Guitars, amplifiers, drums. Bulletin 25c. Hill, 3526 California, Peoria, Ill.

SONGPOEMS Wanted! Collaborate with professional Songwriters equally. Share royalties. Songwriters Contact, 1619-N Broadway, New York 19.

CHORD Manual. Play by chords, it's easy. 306 chords illustrated on miniature keyboards $3.00 Postpaid. Olson Publications, 904 East Saint Joseph, Lansing, Michigan 48912.

BANJO Kits, instruction course complete. Send for catalog. Tradition, Box 292, Woodland Hills, Calif.

SONGWRITERS Demonstration records arranged and recorded by professional band and vocalist. Free details. Herzon Music, 3925 North Conlon Ave., Covina, Calif.

ELECTRIC Guitars, amplifiers, wholesale. Free catalog. Carvin, PSM, Covina, California.

SONGPOEMS Wanted. Send Poems For Offer. Nashville Music Institute, Box 532-PS, Nashville, Tennessee.

BUYING Piano? Avoid regrets. Illustrated instructions telling, point-by-point, difference between good and bad. $1.00. Satisfaction guaranteed. Van Brook, 907 Washington, Oregon, Illinois 61061.

35A PHONOGRAPH RECORDS

DISCOUNTS on all LP's. Free details. Citadel Record Club, 545 Fifth Ave., Dept. 3, New York 17, New York.

2,500 UNUSUAL Hobby, Party Records. Others; Free Catalogue. Rose's Records, 300 Chelsea, Louisville, Kentucky 40207.

36 RADIO, TELEVISION, ELECTRONICS, HI-FI

TAPE recorders. Hi-Fi components. Sleep Learning Equipment, tapes. Unusual values. Free Catalog. Dressner, 1523 Jericho Tpke., New Hyde Park 1, New York.

STEREO Tapes. Save up to 60% (no membership fees, postpaid anywhere USA). Free 60-page catalog. We discount batteries, recorders, tape accessories. Beware of slogans "not undersold," as the discount information you supply our competitor is usually reported to the factory. Saxitone, 1776 Columbia Road, Washington, D.C. 20009.

SLEEP-LEARNING Kits—endless tapes, timers, complete outfits. Catalog free. SLRA, Box 24-SB, Olympia, Washington.

33c TUBES. Radio & TV! Free List. Cornell, 4217-S University, San Diego 5, California.

McGEE Radio Company. Big 1966 catalog sent free. America's best values, Hifi-Amplifiers — Speakers — Electronic parts. Send name, address and zip code number to McGee Radio Company, 1901 McGee St., Dept. PSM, Kansas City, Missouri 64108.

ASTOUNDING Government surplus illustrated catalog 20c. Meshna, Nahant, Mass.

FREE—Free—Free—Free—Free—Free—Free. Send in for your Free one year subscription to Olson Electronics' fantastic value packed catalog—unheard of low, low prices on brand name speakers, changers, tubes, tools, stereo amplifiers, tuners, CB and other values. Credit plan available. If you have a friend interested in electronics send his name and address for a Free subscription also. Olson Electronics, Inc., 437 S. Forge St., Akron, Ohio 44308.

KIT'S Crystal Radio $1.25, Audio Amplifier $1.50. Solar Radio $3.95. Wireless Transmitter $3.95. Lectronix, Box 42-PS1, Madison Heights, Mich. 48071.

GIANT 20th Anniversary Catalog. TV Cameras and Electronic Equipment. Denison Electronics, Rockville, Connecticut.

NEW Mfrs. B. S. R. record changers, UA15 model with stereo cartridge $13.00 each. Parts guaranteed or units exchanged. Quantity discount. Changers, Box 144 Jerome Ave. Station., Bronx, N.Y. 10468.

WANT A MAIL ORDER BUSINESS

Without investing a fortune? HOME BUSINESS DIGEST is your selling Bible. Jam-packed with useful information on where to get astounding bargains with big sales appeal, how to sell for many times your investment. Only $2.00 a year, plus a long list of extra benefits including 4 issues of MAIL ORDER WORLD OF OPPORTUNITIES, worth $1.00 a copy. Carry no stock. Send $2.00 today to

HOME BUSINESS DIGEST Dept. PS-3
2907 West 39th Place, Chicago, Ill. 60632
or Home Business Digest,
G.P.O. Box 972, New York, N.Y. 10001

BUSINESS OPPORTUNITY

Leading camping trailer mfr. seeks qualified dealers. Find out how you can profit from one of the fastest growing retail business opportunities in America. Minimum investment.

WRITE FOR DEALER INFORMATION

REGIS-TRIMLINE, Inc.
13300 Wall St., Dept. P12
Elm Grove, Wis. 53122

PROTECT Your Records! Two Cleaning Cloths $1.00. Towers, Lafayette Hill, Pa. 19444.

WORLD'S Tiniest Radios. Free Catalog. MINI-tronics. 12519. 1983 Via Del Rio. Corona, California 91720.

TRANSISTORIZED Bull Horn and listening device. First used by the U.S. Navy. Projects voice 1,000 feet. Was $29.95, special $12.75. 25 45rpm popular music records $3.75. S & H Sales, Box 115, Brookfield, Ill., 60513.

TAPES: Recorders: Accessories: Finest quality, lowest prices. Send for free list and premium offers. Tape Mart, Dept. W, 39-17 47th Avenue, Long Island City, N.Y. 11104.

IT'S Supercalifragelisticexpialidocious. Free information about Kit-of-the-Month Club. Catalog of printed circuit boards, radio books. Exclusive items. Leader Enterprises, Box 44718KO, Los Angeles, 90044.

37 BUSINESS OPPORTUNITIES

WITHOUT experience, earn up $100 a week, spare or full time, showing 250 fast-selling household necessities. Write Gibson, Dept. 471, P.O. Box 1142, Indianapolis, Ind.

PACKAGE at Home For Profit! We Supply everything. No "selling." Free Home Business details. HPC, 807-HSF Sunset, Los Angeles 12.

BUILD Custom Cases at Home For Profit. Get orders by Mail. We Supply materials, instructions, everything. Free Home Business details. Customcase, 805-CSF Sunset, Los Angeles 12.

$100.00 WEEKLY spare room. Raise redworms odorless, soilless way. Charlie Morgan, Box 116-C Bushnell, Florida.

EARN Money raising fishworms for us! Write: Oakhaven-42, Cedar Hill, Texas.

COLORGLAZED Concrete pottery made without molds. Patented method. Cemetery products, novelties, tiles. Basement leak-sealing. Money-making projects. Booklet, details free. Men only. National Potteries, Grand Rapids, "Minnesota."

SECRETS! Secrets! Mail order success revealed by internationally famous expert who discovered how to make home business fortunes. Beginners: Get free copy "How to Make Money in Mail Order." Discloses free advertising, profitable products, everything! No obligation. Write Mailco, 1554 Sepulveda, Dept. P69C, Los Angeles 25.

LEARN landscaping and the growing of plants. Start a profitable business part or full time. Free information without obligation. Lifetime Career Schools, Dept. PSC-125, 11826 San Vicente Blvd., Los Angeles, Calif. 90049.

400,000 BARGAINS Below Wholesale! Many Free. Liquidations, Job Lots, Single Samples. Free Details. Bargainhunters Opportunities, Box 730-B, Holland, Michigan.

WANT To Make Big Money At Home? $10.00 profit in an hour possible with Invisible Mending. Make tears, holes disappear from clothing, fabrics. Steady year-round demand from cleaners, laundries, homes. Details Free. Fabricon, 1535 Howard, Chicago 26, Illinois.

IMPORT-Export opportunity, profitable world-wide, mail-order business from home, without capital; or travel abroad. We ship proven plan, for no risk examination. Experience unnecessary. Free details. Mellinger, Dept. P69C, Los Angeles 25.

MAILORDER Catalogs. No Inventory required. Discounts 40% up, postpaid. Send 25c for 32-page sample catalog featuring 150 unusual, fast-moving products and complete details. Satisfaction guaranteed. Gaylords, North Adams 8, Mass.

FREE "Franchise Profit Letter" tells how unique NFR service is helping thousands seeking profitable businesses. Write today. National Franchise Reports, PS-528, 333 North Michigan, Chicago 1.

PIANO Tuning learned quickly at home. Tremendous field! Musical knowledge unnecessary. Information free. Empire School of Piano Tuning, Box 327, Shenandoah Station, Miami, Florida, 33145. (Founded 1935.)

SELL Advertising book matches. Write us today; we put you in business by return mail; handling complete line ad book matches in demand by every business right in your town! No investment; everything furnished free! Top commissions daily! Superior Match, Dept. PX-1265, 7530 S. Greenwood, Chicago, Ill. 60619.

START own business! Booklet shows you how! Only 10c. Popular Mechanics Classified, Dept. S-5, 575 Lexington, New York, 10022.

FREE Booklet! Profitable spare-time business Bronzing, PearlKoting baby shoes! Complete set-up on credit. Kiktavi, Box 34861-G, Los Angeles, California 90034.

VENDING Machines—No Selling. Operate A Route of Coin Machines and Earn Amazing Profits. 32-page Catalog Free. Parkway Machine Corporation, 715 PSB Ensor Street, Baltimore 2, Maryland.

OPERATE Collection Agency "Little Gold Mine!" Franklin Credit, Roanoke, Virginia.

PLASTERCRAFT molds, liquid rubber, plasters, flocks, candle supplies. Catalog and manual free. Jayhawk Plasters, Blue Rapids, Kansas.

FREE! 128 Page Illustrated Catalog. More than 2,000 Name Brand Items; below wholesale prices. Sell full or part time. Save hundreds of dollars on purchases for yourself! Watches, jewelry, cameras, radios, phonographs, tape recorders, appliances, housewares, cookware, hardware, power tools, luggage, musical instruments, sporting goods, toys, many others. 8 floors of Name Brands. Orders shipped within 24 hours. Continuous supply. Send for free catalog now! H. B. Davis Corp., Dept. PS, 145 West 15th Street, New York, N. Y. 10011.

EARN Money at home in spare time repairing all Appliances, do housewiring, motor rewinding, electrical maintenance. We show you how, send 8 trouble shooting instruments, business getting materials, etc. Write for Free book. Pay later plan. Advance Trades School, Dept. E-205, 5944 Newark, Chicago 60631.

SELL Uncle Sam! Depression proof home business buying Old Gold. Successful Plan shows how. Details free. Patton, Dept. PS-125, Box 283, Arlington Heights, Illinois.

MAKE excellent profits selling new Delta ignition system. See our ad under "Auto Supplies & Equipment". Write today for details.

Urheberrecht ch geschützt Mag zi al

NEWSPAPERS—Sawdust. Tin-Cans. 200 uses. Instructions $1.00. Charles Co., 42-DPS, Norwood, Ohio.

$25.00-$100.00 weekly Possible. Addressing envelopes. Compiling names. (Longhand-typewriter). Details free. Superior, Box 721-A, Elkton, Maryland 21921.

WORLD'S Largest wholesale supply. Buy from 7853 American, European, Japanese wholesalers. Tailormade suits from Hong Kong. 123 dropship catalogs. Rockbottom prices. Free details. International Buyers, 216 PS2 Jackson, Chicago 6, Illinois.

BOOKKEEPERS operate Bookkeeping Tax Service. Universal. Box 664, Springfield, Missouri.

ARNOLD PALMER offers you unequalled opportunity to profit from tremendous popularity of golf and power of Palmer. Highly profitable exclusive Palmer Golf Franchises available. Complete National program. Hefty profits—minimum investment. Write for details. Arnold Palmer Enterprises, Dept. CP, Pleasantville, New Jersey. Tel. 609-646-3500.

ALL Types of businesses coast to coast. Over 350 local offices to serve you. Call or write for New Free "Business and Income Property Bulletin." United Farm Agency, 612-PS West 47th St., Kansas City, Mo. 64112.

IMPORT-Export Business made easy. Complete setup service. Not just instructions. Hermes, 152 West 42, New York City 10036.

SELL $2.50 value item for only $1.00. Earn 85c profit. Sample, Instructions, $1.00. Home Business Digest, GPO, Box 973-PS2, New York 10001.

CONCRETE Facts: Cement artists make big money at home. Simple equipment. Experience unnecessary. Copyrighted methods. Easy to make unlimited cement pottery designs, bird baths, wishing wells, rustic gardens, patio items, etc., without molds. Formulated, chemical coloring, marbleglazing. Free illustrated brochure. Hollywood Cementcraft, 602 E. Athens, Altadena, California 91001.

LIQUID Rubber Plastercraft Supplies. Plouffe's, 82A Pleasant Street, Worcester, Massachusetts.

YOUR own home business. Interesting, Profitable, Different. Details free. T. Richey, 441 East Main, Greenville, Ohio 45331.

SELL Books By Mail. 400% Profit. Royal, Box 450-M, Cleveland 27, Ohio.

OPERATE Home mailorder business. Vosacek Printing, 4444-PS Ute, San Diego Calif. 92117.

THE Secret of Repairing and Selling used water heaters and water softeners. No competition. Details $2.00. Rudy, P.O. 7468, Robbinsdale, Minn.

HOW to operate home importing business. Free details. Rudinger, Dept. 205, 224 Post, San Antonio, Texas 78215.

AMAZING Profits raising fishworms. Write: Tuff, Center Ave., Chesilhurst, New Jersey.

"GET-RICH" books rented. Free catalog. O'Keefe, Box 207, Hauppauge, New York 11788.

MAIL Catalogs to New Mothers! Profitable! Northland Enterprises, Rhinelander, Wis.

MAILORDER Laws. $2.00. Alvin Kahn, Attorney, 4504-D Pine, Philadelphia, Pa.

HOME Operated Mailorder Business! Everything furnished! American, Box 166C, NYC 10459.

VACUUM Form at home! Mold plastic products for big profit. Fabulous new machineryless method. Free facts. Nationwide Plastics, Box 23321MM, Los Angeles, Calif. 90023.

FREE Literature — Make Big Money Raising Fishworms and Crickets. Carter Farm, Plains, Georgia.

$1600 CONTEST for WRITERS

OF UNPUBLISHED MANUSCRIPTS.

Send for contest rules and free Brochure on publishing your book.

Dept. PS

Pageant Press, 101 Fifth Ave., N. Y. 3

LETTERS OF INQUIRY BOUGHT FOR CASH

Reduce Your Advertising Costs. Sell your Inquiry letters, that could not be converted to customers. We purchase these letters for Publishers Subscription purposes. Send information and sample, stating quality and age of letters.

ACTIVE MAIL ORDER LIST CO.
241 Lafayette St. (Dept. PS) New York

MOULDED Monuments. One man operation. No Machinery. Local material. Granitex, Dyersburg, Tenn.

SPARE Time Earnings. With your Tablesaw, Bandsaw or Jigsaw. Write: Workshop, B3800 Harney, Vancouver, Washington 98660.

CEMENTCRAFT — plastercraft for pleasure and profit Sample, catalogue 10c. Wooley Company, Box 29-D, Peoria, Illinois.

$60.00 DAY, manufacturing Concrete Posts. Carlane, 1803 Fremont, Rapid City, South Dakota 57704.

$70 WEEKLY—Home spare time. Simplified mail bookkeeping. Immediate income—easy! Auditax, 34741D, Los Angeles 90034.

READING Tutors earn $5 to $10 hourly. Learn at home. No educational requirements. Free Information. Reading Arts Academy, Dept. PSC-124, 1100 West "Q," Wilmington, California.

DEVELOP your business or idea with abundant capital. Details free. Sullivan, Box 20266A, Denver, Colorado 80220.

MOTEL Management—Approved home study course. Free Booklet #111. Motel-Hotel Careers, Encino, California 91317.

FREE Book "990 Successful, Little-Known Businesses." Fascinating! Work home! Plymouth-852P, Brooklyn, New York 11218.

I MADE $40,000.00 Year by Mailorder! Helped others make money! Start with $10.00—Free Proof. Torrey, Box 3566-F, Oklahoma City, Oklahoma 73106.

MAKE Money mailing our postcards! Work home, full, sparetime. Particulars 10c. Westlee, Western Springs 2, Illinois.

MAKE $46 From Square Foot Plywood; Jigsaw necessary. Free Details. Woodarts, Bridgewater, Mass.

38 MONEYMAKING OPPORTUNITIES

TO $100.00 Weekly. Mailing Catalogs. Sample, instructions, 25c. Costar, GPO Box 972-PS, New York 1.

EARN Big Commissions Full or Part Time. Show America's largest line low priced business printing and advertising specialties. Calendars in season. Big Free Sales Kit samples hundred items used daily by business people. Build profitable repeat business. Start right now. National Press, Dept. 21 North Chicago, Illinois.

HOT Money Making Line! Show line of business printing, advertising specialties, calendars. Watch orders pour in. All repeat items. Terrific commissions in full or spare time. No experience—No investment. Cash discounts to customers. Free bonus gifts to you. Free sales kits. Willens-David Lionel Press, Dept. W-17, Waukegan, Illinois.

AMAZING successes through franchises! Become exclusive franchise holder your territory. Information rushed. National Franchise Reports, SP-528, 333 North Michigan, Chicago 1.

MEN — Women! Start Money-Making Plastic Laminating Business at home in spare time. Material that costs 11c brings back $2.58. No canvassing or selling but mail orders bring in $20 a day. Write for full particulars free. Rush name on postcard to Warner, Room CL-3-LW, 1512 Jarvis, Chicago 26, Ill.

EASY to start rubber stamp business at home in spare time. Make up to $9.80 an hour without experience. Facts free. Write to Roberts, 1512 Jarvis, Room CR-3-LW, Chicago 26.

MAKE Money Writing Short Paragrapns! No tedious study! I tell you what to write, where and how to sell, and supply list of editors buying from beginners. Many small checks add up quickly. Write to sell, right away. Send for free facts. Benson Barrett, Dept. C-86-HA, 6216 No. Clark, Chicago 26.

CLIP items from daily newspapers. Get $1.00 to $5.00 each. Details free. Walter, Box 1023-S, Erie, Penna.

FREE facts and descriptive bulletin. Be an Air Conditioning, Refrigeration, and Heating serviceman. High pay, jobs open everywhere, operate your own service business, no school or correspondence necessary. Write Doolco Trouble Shooter, 2016 Canton, Dallas, Texas.

FREE! World's Greatest Mail Order Medium! Bargains Galore! Business Opportunities, etc. Popular Mechanics Classified, Dept. W-1, 575 Lexington, New York 10022.

DETECTIVES — Excellent opportunities —Travel. Experience unnecessary. Detective Particulars free. Write Wagoner, P-125 West 86th, New York 10024.

WORK Home, part-time, mailing our catalogs! Free details! Cam Company, Dept. 22, Verona, N.J.

VENDING Machines—No Selling. Operate A Route of Coin Machines And Earn Amazing Profits. 32-page Catalog Free. Parkway Machine Corporation, 715 PSM Ensor Street, Baltimore 2, Maryland.

EARN Big Money Fast! Take easy orders for Dwarf, Semi-Dwarf, Standard fruit trees, roses, ornamentals. $1,000 profit in 60 days possible. World's oldest, largest Nursery. Spectacular full-color selling outfit Free. No Investment. Stark, Desk 30166, Louisiana, Missouri 63353.

CAMERA Owners! Earn weekend cash! Work any locality-hours-season. "101 Ways to make money with your Camera", tells how. Instructions $1.00 Guaranteed. Carstens, 406-A South Second Street, Alhambra, California 91802.

FREE details, operate collection agency. Big Money. American, 2121 Sunset Strip, Ft. Lauderdale, Fla. 33313.

MAKE $5,000 yearly, sparetime, raising mink, chinchilla, nutria, etc. Free Booklet! Proven plan. Write Furs, Dept. K, Bewdley, Ontario, Canada.

MINK raising information free. Lake Superior Mink Farm, Inc., Superior, EE5, Wisconsin 54882.

"VACATION With Pay." Makes money and travel. 100 ways. Details. Trail, Box 415, Abilene 1, Texas 79604.

$25.00-$75.00 Weekly Possible Clipping Newspaper Items. Complete instructions. $1.00. Harvey's, Box 692, Elkton, Maryland 21921.

PAINT Portraits for Profit! Everything you need to learn, includes Fleshtone oil paints, in one easy course. Anyone can do it—even in spare time. Details Free. Merlin Enabnit, Dept. 1E4, 141 W. Jackson, Chicago 60604.

WEAVE Rugs—Make Good Profits—No experience necessary! Free Catalog, sample card, and low prices on carpet yarn, rug filler, looms, parts, inexpensive beam counter. If you have loom—advise make, weaving width, please. Or. Rug Company, Dept. X593, Lima, Ohio.

$500.00 Monthly Possible Addressing Envelopes. Ideal Part-time, Full time Home Business. Guaranteed Plan—$2.00. Wellings, RD 2, Roxburg, Phillipsburg, N. J. 08865.

SMELT Sponged up Gold on rust of tin cans submerged in water. Instructions $1.00. Joseph Dorsney, P. O. Box 343, Norristown, Pa.

Urheberrecht chgeschützes Material

"UNLIMITED Income possible, no franchise, your own business. Details $1.00. BAK, 930 A Mars Drive, Middletown, Pennsylvania 17057."

MAKE Up To $50.00 Daily Soliciting Delinquent Accounts. Terrific Commissions. General Finance Co., Dept. LG-88, Pickwick Bldg., Kansas City, Mo. 64106.

EARN Extra Cash! Work home, part-time. Details—stamp. Money-Maker, Box 3671, Milwaukee, Wisconsin 53217.

THE Key To Success: Manufacture your own product; 2c makes article, retails at 50c. Every car owner a prospect. For full particulars send $5.00 for magic formula. Ashley, 1207 Evangeline Ave., Orlando, Fla. Make $5.00 an hour.

"MAIL Order World Of Opportunities" latest issue; prints all kinds of bargains and new product sources. Rush only $1 for your copy today. Marathon Products, Box 113, Coos Bay, Ore.

MONEYMAKING mailorder opportunities! Details—stamp. Bargains, Box 8024, Greensboro, N. C.

FREE Literature — Make Big Money Raising Fishworms and Crickets. Carter Farm-11, Plains, Ga.

HOMEWORK Opportunities! 100 companies begging for sparetime homeworkers! Complete list, instructions, $1.00. Brugenheimer Publishers, Box 158-AG2, Lexington, Mass.

MAKE money running your own restaurant. Information free. Write Dept. PS-9, Restaurant Management Institute, 3854 N. Sawyer, Chicago, Ill. 60618.

LEARN The secrets of repairing junk batteries. "Fabulous Profits" at home. Details: Batteryman, P.O. Box 416, Palm Desert, California.

SHARP $$$$ opportunity! One low-cost machine sharpens-serrates knives, scissors, pinking shears. Earn $6-$9 hourly in spare time. Professional results without experience. Free details. Beaver Grinder, Box 121, Gardena, California.

TYPISTS! Learn how to earn to $2 hourly typing at home. Archer, 819 Ash, Harrison, Arkansas 72601.

GIANT Pine Cones for Xmas decorations. Wholesale price list. Box 102, Fountain, Florida.

$100.00—Day's Homework! No experience, investment.—Free Details! Tucker, RD 1, Howard, Penna. 16841.

38A BUY IT WHOLESALE

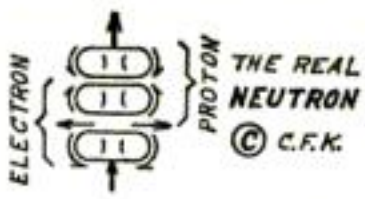
BARGAINS! Buy Wholesale! Save Money! Free Catalog! Norris, Dept. 116, 273 Merrick, Lynbrook, N. Y.

NEW 6-color Deluxe below wholesale catalog. Automobile catalog and others. Housewares, clothing, furs, furniture, appliances, refrigerators, washers, dryers, vacuum cleaners, polishers, cookware, dinnerware, strollers, cribs, radios, stereos, phonographs, recorders, musical instruments, organs, typewriters, books, binoculars, luggage, sporting goods, bowling, golf, game tables, motor scooters, motor golf carts, power mowers, chain saws, boats, motors, bicycles, clocks, watches, diamonds, jewelry. Huge discounts, hundreds name-brand items. For free list (factory prices) postcard: Selbyco-6, Decatur, Illinois.

BARGAINS! Buy Wholesale and Below! Name Brands. Appliances, Furniture, Sports Equipment, Televisions, Cameras, Watches, Jewelry, Thousands More. Huge Discounts to $1.000.00 on New Automobiles. All Makes. Free Details. Write Today: World-wide Bargainhunters, Box 730-B, Holland, Michigan.

WORLD'S Largest wholesale supply. Buy from 7853 American, European, Japanese wholesalers. Tailormade suits from Hong Kong. 123 dropship catalogs. Rock-bottom prices. Free details. International Buyers, 216-PS Jackson, Chicago 6, Illinois.

1965 CARS $995. Ford, Chevrolet, Dodge. Four-door, 6 cylinder, automatic transmission, heaters. Choice of color. 1964 Cars $595. Guaranteed motor, transmission, rear end. Nationwide delivery. Free Illustrated catalog. Write: Dept. A-9, Consolidated Auto Wholesalers, 120 East 56th Street, New York 10022.



VORTEX atom booklet on the real atom which has no nucleus and no orbital electrons.

Third edition, 25 cents.

C. F. Krafft, 4809 Columbia Road
Annandale, Virginia 22003

ELECTRIC Guitars, amplifiers, wholesale. Free Catalog. Carvin, PSW, Covina, California.

100,000 PRODUCTS Wholesale. Terrific Bargains! Wholesalers, 1265 Broadway, New York 1, N. Y.

38B IMPORT-EXPORT

TAPE Recorder direct from Japan. Only $11.80. Sell others. Dunnecord, 7707 Chappel, Chicago.

MEXICAN Imports — Bargain prices. Free price list. Box 21012, Benbrook, Texas.

DROPSHIP yourself to wealth. 110 best worldwide dropshippers list, $1.00. Linco, 5117-E East 22nd., Tulsa, Okla. 74114.

GERMAN Crafted Stopwatch. 5mm. Silver Case. Great Gift for anyone. Nationally advertised $17.95 now only $12.75. Dealers inquiries invited. D. M. Dalton & Co., 6075 Dryden, Cincinnati, Ohio 45213.

39 FORMULAS, PLANS, ETC.

FORMULAS—All Kinds. Amazing Big Catalog 10c. Kemisco, Park Ridge 15, Illinois.

10,000 Money-making formulas, processes, 900 pages. $6.00. Wilson, Box 599-A, Markham, Ontario, Canada.

LATE Modern Manufacturing Formulas List Free. Chemical Service, Martville, New York.

OUTSTANDING Book of formulas, processes, trade secrets. Free literature. Cassell, Box 1535, Eugene, Oregon 97401.

MAKE your own products. Details free. McDaniel, 17886 Jos Campau, Detroit 12, Michigan.

FOR Proof Of What You Can Do In Specialty Manufacturing Get Our Literature. It's Free! Miller—Chemist, 1517-A, Tampa, Florida.

40 PLASTICS

NEW Liquid casting plastic, clear, colors. Embed real flowers, butterflies, photos, coins. Send 25c for two handbooks "How to Cast Liquid Plastics" and "How to Make Extra Money at Home." Castolite, 65-102P, Woodstock, Illinois.

NEW! Pressure Sensitive Plastic Laminating Machines. Supplies. Details. Burr, 7645 Oakland, Kalamazoo, Michigan 49002.

PLASTIC Embedders, Jewelry Workers, We have everything. Moulds, Findings. New Catalog 25c. David Co., 861 Broad St., Dept. P, Providence 3, R. I.

VACUUM form. Machine Plans, plastic, information FREE—Prent, 1168 Columbus, Janesville, Wis.

PLEXIGLAS — Any thickness — Clear —Colors—Cut to size—Clear Rods—Tubing. McClarin Plastics, P.O. Box 168B, Hanover, Pennsylvania.

HOBBY, Laminated Engravers, Rubber Stamp Makers Supplies. Prices, Bedford, Box 366, Stanton, California 90680.

41 SCIENCE & CHEMISTRY

ROCKETS. New Illustrated Catalog 25c Single And Multistage Kits, Cones, Engines, Launchers, Trackers, Technical Information, Etc. Fast Service. Estes Industries, Penrose 6, Colorado.

AMAZING New Book Of Science Experiments, formulas and Catalogue of Laboratory Supplies. Only 35c. National Scientific Co., Dept. PS-12, 13 S. Park Avenue, Lombard, Illinois.

COPYRIGHTED theory gravitation because radiation from billion stars hits everywhere, rebounding from mass. $1.00 refundable. Carnahan, 4407 Avenue H, Austin, Texas.

ROCKETRY!! Kits, single-multistage. 2,000 feet with powerful engines. Cones, Tubes, Parachutes, Launchers, Igniters. Big Catalog, rocket data, diagrams—25c Fast Delivery. Centuri Engineering, Dept. 43, Box 1988, Phoenix, Arizona 85001.

CHEMICALS, laboratory apparatus, microscopes, mineralogy sets and telescopes. Catalog 35c. Shead Science Supplies, Columbus, Wisconsin.

ILLUSTRATED Catalog; Chemistry, mineralogy, biology 25c. Tracey Laboratories, Evanston, Illinois.

"BLOOD Smears, anatomy slides." Samples, list—$1.00. Paragon, Box 10541, Atlanta, Georgia.

UNDERWATER Fuse 3/32" diameter 40 feet with plans, formulas, instructions. $1.00 Postpaid. 100 feet $2.00. Wayno 182-A, Addison, Mich.

TECHNICAL Chemicals, Apparatus Experiments. Catalog 20¢. MB Laboratories, Box 1922, Phila., Pa. 19105.

ROCKETS! Flight Kits, Test Equipment. Catalog 25c. Rocket Development Corporation, Route 3, Seymour, Indiana.

UNUSUAL Chemistry books, courses, kits! Rare chemicals, cheap! Catalog 25c. National, Box 94, Redwood City, Calif. 94064.

LABORATORY conversion charts with discounts Catalogue—25c. Hagenow Laboratories, Manitowoc, Wisconsin 54220.

EXPERIMENTS, Chemicals, Apparatus, Biologicals. Illustrated catalog. Only 35c. Special—Chemical Resistant Gloves with Catalog. Dover Scientific, Box 6011, Astoria 6, New York.

CHEMICALS, small quantities, all grades. Glassware, apparatus, equipment, supplies. Catalog 35c. Eastern Laboratory Supply, 383 Johnson, Englewood, N.J. 07631.

64-PAGE color catalog. Science, Electronic, Chemistry and hobby kits. Radio kit $2.98. Solar Engine $1.49. Send 25c; Schoolmasters Science, 745 State Circle, Ann Arbor, Michigan.

ROCKETS. Illustrated catalogue, single, multistage kits, parts, famed accelerometer 25c. Rocket Supply, Box 51B, Tappan, New York 10983.

FREE 3 Pyrex Test Tubes With Purchase $4.00. Catalog 25c. Chemicals, Apparatus, Biology. Mid-States Scientific, 7053 N. Clark, Chicago, Ill.

UNDERWATER Fuse—36 feet $1.00 Postpaid—plus pyrotechnic catalogue. Christie, Box 85, Bergenfield, New Jersey 07621.

CONTACT Explosive: Explodes with touch of feather. Handled safely wet. Powerful. Ideal for jokes. Applies like paint. Made from household chemicals. Results guaranteed. Complete instructions $1.00. Franks Scientific Company, P. O. Box 156, Martelle, Iowa 52305.

AMATEUR Scientist's Magazine—Useful Information—Ideas. Sample—29c, $1.00 Yearly. Experimenter's Magazine, Manitowoc, Wisconsin 54220.

CHEMICALS and apparatus for industrial, analytical and private laboratories. Catalog 35c. Dept. M-26, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 20, N. Y.

CHEMISTRY catalog still 25c. Free expendibles kit with most orders. Laboratory Sales, Box 161-B, Brighton 35, Mass.

FREE. Science Catalog. Chemicals, glassware, physics, biology. Frey Scientific, 465 S. Diamond, Mansfield 6, Ohio.

300 PAGE Chemical Apparatus Catalog $2.00. Laboratory Materials, 1332 Hydepark, Chicago 60615.

AMATEUR Rocketeers; Newest Manual yet, "Rocket Propulsion Principles", Formulas, firings, designs. Send $1.00. Aero-Fax Publications, P.O. Box 244, Lake Worth, Florida.

SAMPLE fuse (one foot)—10c. S & C Labs, 21863 Colgate, Farmington, Michigan 48024.

Urheberrechtlich geschütztes Material

UNUSUAL. Exciting formulae: Smoke, powders, rocket fuels, hydrogen balloons, self-igniting mixtures, many more! Folio 50c. B H Associates, Box 505, Holland, Michigan.

42 EMPLOYMENT INFORMATION

DIRECTORY Reports. Construction, Aviation, Shipping, Oilfields, Government Manufacturing, Trucking, etc. Foreign—Stateside. Helpful information plus job-getting tips on preparing application letters. Unconditional money-back guarantee. Only $3.00 ($3.25 Airmail). Research Services, Box 6768-PS, St. Louis, Missouri, 63144.

FOREIGN Employment. Construction, other work projects. Good paying overseas jobs with extras, travel expenses. Write only; Foreign Service Bureau, Dept. PS, Bradenton Beach, Florida.

TREMENDOUS Job Opportunities. Foreign-U.S.A., Construction, Trucking, Manufacturing, Government, Shipping. Thousands More. Up to $2,000.00 Monthly! Moneyback Guarantee. Directory Plus Sample Application Form Only $1.00 ($1.25 Air Mail). Worldwide Opportunities, Box 730-B, Holland, Michigan.

FOREIGN Employment: South America, Africa, Europe, Australia, USA. Earnings to $2,000.00 monthly. Construction, all trades, professions, occupations. Many companies pay fare, housing, benefits, bonuses. Write: Universal, Dept. A-3, Woodbridge, Connecticut 06525.

"**BE A Real Estate Speculator.**" No investment required. Earn $1000.00 monthly in your neighborhood. Send $5.00 to licensed Broker for complete information. Orin M. Horner, 3286 Sunrise Highway, East Islip, New York.

TREMENDOUS Opportunities. U.S.A.-Overseas. Choose Jobs—Locations—Transportation. Free details. Occupations. International Airport, Box 100-M11, Jamaica 30, New York.

CAPE Kennedy, Caribbean. All trades. Information, Pictures. $1.00. Research, Box 334-A, Cape Canaveral, Florida 32920.

43 AGENTS WANTED

MAKE $280.00 getting just 10 growers to try Campbell's Plant Food. Sample free. Campbell, Rochelle 22, Illinois.

YOUR Own business—Suits $1.50; Overcoats 65c; Mackinaws 35c; Shoes 12½c. Ladies' Coats 30c; Dresses 15c. Enormous profits. Catalog Free. Nathan Portnoy Associates, 2109-J Roosevelt Road, Chicago 8, Ill.

EVERY man a prospect. Refundable sales kit offer showing line belt buckles, tie clasps, money clips, cuff links, lapels, identification badges, individualized with customer's name and emblems. Cap badges for trucking, bus, taxi, police, firemen, also postal, letter carriers and heavy construction emblems. Choice 3000 emblems. Hook-Fast, Box 1088-PS, Providence, R. I.

BIG profits selling automotive specialties to service stations, garages. Free wholesale price list. Inka Industries, 2405 Crocker, Houston, Texas 77006.

START Your Own Rawleigh Business On Credit. Expansion program makes openings now for permanent, profitable work. Start at once. Write Rawleigh, Dept. L-78PSC, Freeport, Ill.

AGENTS—300% profit selling genuine gold window letters: stores and offices. Free samples. Metallic Sign Letter Co., 1217-E West Newport, Chicago.

ESTABLISH Your Own Business. Low Prices On Used Clothing, Shoes, Household Goods. Unlimited Profits. Free Catalog. Northwestern Distributors, 2129 North Western Avenue, Chicago, Illinois 60647.

44 HIGH-GRADE SALESMEN

EARN Big Commissions Full or Part Time. Show America's largest line low priced business printing and advertising specialties. Calendars in season. Big Free Sales Kit samples hundred items used daily by business people. Build profitable repeat business. Start right now. National Press, Dept. 20, North Chicago, Illinois.

SPECIAL
SLIDE RULES
FREE catalog lists over 200 different slide rule, selectors & calculating aids.
DYNA-SLIDE CO. 600 S. Michigan Chicago, Ill. 60605

Since 1887
Bowman Technical School
Bowman Bldg. Lancaster, Pa.
Resident Courses offered in
WATCHMAKING and **REPAIRING**
ENGRAVING and **JEWELRY REPAIR**

LEARN WHILE YOU SLEEP!

Fascinating, educational! Use your recorder, phonograph. Details, gigantic tape, record, equipment catalog FREE!
S.L.R.A. Box 24-B
Olympia
Washington

BE A CAMERA CRAFTSMAN
opportunity for big-pay jobs or business. Now YOU can learn to repair cameras . . . at home, in your spare time! Free booklet tells how. NHSC accredited course includes all instruction, tools, practice equipment. Write today!
NATIONAL CAMERA REPAIR SCHOOL
Dept. P.E. ENGLEWOOD, COLORADO 80110

HOT Money Making Line! Show line of business printing, advertising specialties, calendars. Watch orders pour in. All repeat items. Terrific commissions in full or spare time. No experience—No investment. Cash discounts to customers. Free bonus gifts to you. Free sales kits. Willens-David Lionel Press, Dept. W-16, Waukegan, Illinois.

EARN extra money selling advertising book matches. Sample kit furnished. Matchcorp, Dept. PS-125, Chicago, Ill. 0632.

YOUR free copy of World's biggest sales magazine tells you how and where to make more money on your own in selling. Write Specialty Salesman Magazine, Desk 3B, 307 North Michigan, Chicago 1.

AMERICA'S biggest value wedding line! Big 40% profit showing wedding invitations and over 50 exciting accessory items. Ideal sideline for Christmas card, printing salesmen. Write for free display album. Elmcraft, Dept. EW 167, 7201 S. Cicero, Chicago, Illinois, 60629.

FREE to salesman, descriptions and pictures 200 new, fast sellers for spare time cash or side line profits. No charge. Just send name, age for sample copy. Opportunity Magazine, 850 N. Dearborn, Dept. 18G, Chicago, Ill. 60610.

$1,000.00 A month for making dramatic 3-second demonstration of amazing lightweight Presto Fire Extinguisher. New chemical used by Airforce snuffs out fires instantly. Only $4.95. Terrific commissions. Millions want it. Free Kit, Merlite, 114 E. 62nd, Dept. P66-S, New York 16.

SENSATIONAL new longer-burning Light Bulb. Amazing Free Replacement Guarantee—never again buy light bulbs. No competition Multi-million dollar market yours alone. Make small fortune even spare time. Incredibly quick sales. Free sales kit. Merlite (Bulb Div.), 114 E. 32nd, Dept. C-73-S, New York 16.

SELL Advertising book matches. Write us today; we put you in business by return mail, handling complete line ad book matches in demand by every business right in your town! No investment; everything furnished free! Top commissions daily! Superior Match, Dept. P-1265, 7530 S. Greenwood, Chicago, Ill. 60619.

ASTONISHING Automatic Toilet Bowl Cleaner, deodorizer. Works when toilet is flushed. Housewives buy on sight for every bathroom, at only $1.98 each. Make up to $10.00 in hour, spare time. Free Sales Kit. Merlite, 114 East 32nd, Dept. G-71S, New York 16.

CALENDARS, Novelties—Full or Part Time. Liberal Commissions. Fleming, 6535-B, Cottage Grove, Chicago 37.

45 EDUCATIONAL & INSTRUCTION

PIANO Tuning Pays. Big money in spare time. Learn at home. No musical knowledge necessary. Phonograph, records, tools and instructions furnished. Electronic tuning also taught. Free catalog. Capital Tuning School, 3160 S.W. 16th Court, Ft. Lauderdale, Fla.

B.Sc. DEGREE (Engineering) or College Entrance by home study. Send $1 for 1966 prospectus. CIST, Suite 815, 263 Adelaide St. W., Toronto, Canada.

LEARN to Drive Tractor Trailer, Trucks, Buses. Short Concentrated Courses Available. Write for Free Brochure Driver Training Institute, 794 Bedford Avenue, Brooklyn, N. Y. JA2-5080.

BE A Real Estate Broker. Insure Security for yourself and your family. Study at home. Prepare for state examination. Write for Free Book today. Weaver School of Real Estate, 3519-R Broadway, Kansas City, Mo. 64111.

LEARN Communications Electronics. Get F.C.C. License. Correspondence, or resident classes. Free details. Write: Dept. 5, Grantham Schools, 1505 N. Western, Hollywood, Calif. 90027.

BOOKKEEPERS — Operate Your Own "Dollar-A-Week" System. Ellis, Box 203, Cedar Grove, North Carolina.

FCC LICENSE in 6 weeks, First Class Radio telephone. Results Guaranteed. Elkins Radio School, 2603A Inwood, Dallas, Texas.

WOODWORKING and Cabinetmaking course for beginning and advanced home craftsmen. Only complete low-cost home training program available. Write for free booklet. Interstate Training Service, Dept. G-2, Portland 12, Oregon.

PIANO Tuning quickly learned with home study course. Diploma granted. American Tuning School, Gilroy, California.

USED Correspondence Courses and Books sold and rented. Money back guarantee. Catalog free. (Courses Bought.) Lee Mountain, Pisgah, Alabama.

GRAPHOANALYSIS — Learn scientific handwriting analysis for profit, pleasure. Free sample lesson, catalog reveals plan. Write IGAS, Inc. 325 Jackson, Dept. 2AW 1, Chicago 6.

MISSOURI Auction School. Free catalog! 1330-05 Linwood, Kansas City, Mo. 64109.

"**FINGERPRINTING** By Correspondence." Civil Service Opportunities. Good Pay. Fingerprint School. 2759G-West Broadway, Los Angeles 41, Calif.

DEVELOP Mind Power, personality, memory while asleep! Free details. SLRA, Box 24-SF, Olympia, Washington.

EARN as you learn, camera repair. National Camera Repair School offers accredited Home Study Course—instructions, texts, tools and practice equipment. Free information. Write Box 174PE12 Englewood, Colorado, today.

HIGH School Diploma at home. Qualified instructors. Approved materials. Southern States Academy, Professional Bldg., Dept. 12, Decatur, Ga.

Urheberrechtlich geschütztes Material

MASTER Watchmaking at home. Free sample lesson. Chicago School, Dept. WY, Fox River Grove, Ill. 60021.

LEARN Civil and criminal investigation at home. Earn steady, good pay. State age. Institute Applied Science, 1920 Sunnyside, Dept. 339, Chicago 40, Illinois.

LEARN to Service Oil Burners. Free information. Marlin Institute, Box 66095, Portland, Oregon 97266.

COMPLETE your High School at home in spare time with 68-year-old school. Texts furnished. No classes. Diploma. Information booklet free. American School, Dept. X946, Drexel at 58th, Chicago 37, Illinois.

LEARN landscaping and the growing of plants. Start a profitable business part or full time. Free information without obligation. Lifetime Career Schools, Dept. PSC-125E, 11826 San Vicente Blvd., Los Angeles, Calif. 90049.

USED Courses! Books! List 10c. Smith's 124 Marlborough, Salem, Mass.

FREE General Catalog—100 Pages Text vocational, educational, instructional subjects. Millions of volumes, new and used. Bargain prices. Books bought. Est. 1902. Long's College Book Co., Dept. PS, Columbus 1, Ohio.

PENMANSHIP Correction: Improve poor penmanship quickly. Details free. Ozment, Box 665 35, St. Louis 88, Mo.

DRAFTING: Mechanical, Architectural, Electronic. Box 641, Los Alamos, New Mexico.

LEARN Handwriting Analysis. International, Box 500, 11749 Eldridge, Lakeview Terrace, Calif.

"MATHEMATICS in Spanish by correspondence." Inmuto, Box 1791, Calexico, California.

NEW Home Radio Course only $26.95. All tubes, components, tools, books included. Money-back guarantee. Free literature upon request. Edu-Kits, Department 632-A, Hewlett, New York 11557.

LEARN Spanish the easy way. $9.95 complete course. Box 21012, Benbrook, Texas.

DRAFTING (Electronic, Mechanical, Architectural, Art). Home Courses $25.00. Send $2.00 first lesson. Prior, Inc. 23-09 169 Street, Whitestone 57, New York.

FREE Bible Course. Degree, College, 143 South Gregg Street, Charlotte 8, N.C.

LEARN Auctioneering. Free Catalog. Reisch Auction College, Mason City 3, Iowa.

LOOKING for Higher Pay? Study business courses at home. Prepare for good paying position in business and industry. Men, Women, write for details. Aladdin Home Study Courses, Dept. A, 409 St. Louis, Springfield, Mo. 65806.

LEARN Technical Writing at home. Free brochure. California Educational Enterprises, (D-P), P.O. Drawer XX, Palm Springs, Calif. 92263.

USED Courses, Books. Catalog 10c. Bayles, 78D Courtright, Wilkes Barre, Pa. 18702.

EARN valid undergraduate or graduate college degree through correspondence. Free catalog. Registrar, Bretton Woods University, 3936 East 10th Street, Indianapolis, Indiana.

ENGINEERING Home Study Simplified. Details. Erkatech, 7027 Smith, North Bergen, New Jersey 07047.

BECOME a Radio Announcer! Exciting, profitable career. Full details Free! AIRA, 1705 West Cone, Greensboro, North Carolina.

46 CONTESTS

SWEEPSTAKES Contests. How To Win. Write for free information. General Contests, 1609-19 East 5th, Duluth, Minn. 55812.

WIN Cold Cash! Prizewinner sizzles with terrific contests, torrid tips, impertinence! Free sample! Box 11569, St. Petersburg, Fla.

47 DETECTIVES

DETECTIVE Training. Robert B. Phillips, Sr., Founder, Former Govt. Special Agent. For free information write to: 1917C North Kenneth Ave., Chicago, Ill.

EASY-ON PLASTIC LETTERS

Pressure-sensitive vinyl plastic letters, numbers and symbols are easy to apply, adhere to any surface. They're weatherproof, washable, permanent . . . indoors and outdoors. Thousands of uses in the home and office. In five colors (red, white, blue, gold, black) and four sizes (5/16", 1/2", 1", 2" high). Moneyback guarantee.

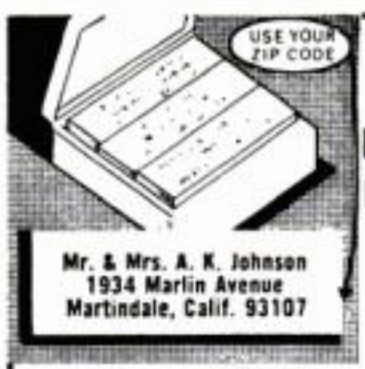
Over 1,000 for $1.00

Please specify size and color.

Over 1,000 characters for $1 in 5/16" size; Over 500 for $1 in 1/2" size; Over 200 for $1 in 1" size; Over 100 for $1 in 2" size.

Add 15¢ per order for handling.

WESTWOOD SALES CO.
Dept. ZM-5, P.O. Box 295, Westwood, N.J.



1000 Name & Address Labels $1 ppd.

Special Offer

Any 3 Different ORDERS $2

Sensational bargain! Your name and address handsomely printed on 1000 finest quality gummed labels. Padded—packed with FREE useful Plastic GIFT BOX. Use them on stationery, checks, books, cards, etc. *1000 only* $1. SPECIAL—SAVE MONEY! ANY 3 DIFFERENT ORDERS $2. Makes an ideal gift.

HANDY LABELS
1145 Jasperson Bldg.
Culver City, Calif. 90230

$2,500.00 IN PRIZES . . . to encourage literary talent. Write for details! We help place and sell short stories, articles, books, plays, poetry. Write today!

Daniel S. Mead, Literary Agency
915 Broadway, Dept. 125, New York, N.Y. 10010.

DETECTIVE Profession. Home Study, Lapel Pin, Certificate, Future 2759CB West Broadway, Los Angeles 41, California.

DETECTIVE Course. Credentials, Diploma. Free Information, Southwestern Institute Criminology. Box 202, Geronimo, Oklahoma.

DETECTIVES — Excellent opportunities —Travel. Experience unnecessary. Detective Particulars free. Write Wagoner, P-125 West 86th, New York 10024.

DETECTIVE Course. Free Information. Universal Detectives, Box 8180E, Universal City, California 91608.

49 GIFTS

BLACK FOREST 8" Doll. Authentic Costume. Airmailed from Germany, $4.95. PTC, 4518-N Ash, Spokane, Wash. 99205.

MECHANICAL Pencil Calculator, adds, subtracts, multiplies, divides, square roots, 6¼" x ¼" gold anodized aluminum casing. $2.95, ppd. No COD. Weiser, Dept. 2, 1417 S. Fairfax Ave., Los Angeles 19, Calif.

UNIQUE Jeweled Swiss Calendar Watch with Floating Jet Plane Second Hand. Shockproof, Waterproof, Antimagnetic. Expansion Band, Guaranteed. $14.95. Mel Levine & Co., 5159 S. W. 5th Terrace, Miami, Florida 33134.

51 SPECIAL SERVICES

IDEA Matching, filing, information 10c. Confidential Idea Center, Box 291, Waukegan, Illinois 60086.

FACTS, any subject-product, research, reports. Plan $1.00. Horton, Box 1431, Greenville, South Carolina 29602.

52 AUTHORS SERVICE

BOOK Printing. Budget prices. Free details. Graphicopy Inc., Dept. PS-2, Box 285, Floral Park, N. Y.

WANT Your Book Published? Learn how we publish, advertise, promote, distribute. Many successes. Free booklet PS. Vantage, 120 West 31, New York.

54 ART INSTRUCTION, CARTOONING, SIGN PAINTING

LEARN Sign Painting, Fascinating System. Straley, 410-P South Western, Springfield, Ohio.

18 CARTOON Lessons $2.00. 24 Advertising Lessons $5.00. Rm. 109, 2-6 Office Park, Birmingham 23, Ala.

"HOW to Make Money With Simple Cartoons." Everyone who likes to draw should have this book; Free! Send name, zip code. Cartoonists' Exchange, 1912 Pleasant Hill, Ohio 45359.

CARTOONERAMA Teaches you Cartooning in a new 24 lesson course. Free brochure. CFA, Box 263-1Y, Branford, Connecticut.

EARN $4.00 hour sketching portraits from photos. Work home—anytime. Revealing, personal methods. $3.98. Free details. Gemery, 365 Longhill Avenue, Shelton, Conn. 06484.

SIGN Painting-Instructions, Brushes, Equipment. Free Catalogue. Kaufman Supply, Centertown, Missouri.

ART Lessons—$6.00 a month. Includes Drawing, Painting, Advertising Art. Art Kits (worth $25) and materials. Assignments corrected with overlays, by mail and returned to you. Write for free book. No obligation. Washington School of Art Studio 1512, Port Washington, L. I., N. Y.

LIKE to draw? Splendid opportunities in professional cartooning. Write for Free Catalogue. No obligation. National School of Cartooning, Box 8979-E, Cleveland 99, Ohio.

LEARN Profitable Magazine Cartooning! Free Details. Cartoonists, Box 3097, Lincoln 10, Nebr.

56 RUBBER STAMPS & OFFICE SUPPLIES

POCKET 3 Lines $1.00. Office stamps $1.50. Free catalog. Specialty, 8464 Manhattan, Detroit, Michigan 48211.

SENSATIONAL new multi-color rubber stamp products. Good profits. Write, Norcini, 699 N. Wayne Ave., Wayne, Pa. 19087.

THREE line pocket or office stamp $1.00. Win Atherton, Box 61, Randolph, Massachusetts.

90% Profit Rubber Stamps. Complete outfit $99.95. Duckmann, Avoca, Arkansas.

57 PRINTING MULTIGRAPHING, ETC.

BEAUTIFUL Business Cards, letterheads, envelopes, fliers, etc. Low prices. Free samples and price list. Pioneer, PS-12, Island Park, N. Y. 11558.

1,000 GUMMED Address Labels $1.00. Walt's, Box 966, South Bend, Indiana, 46624.

Urheberrechtlich geschütztes Material

100 PRINTED 5½ x 8½ letterheads and 100 #6¾ envelopes $2.75. Pricelist free. Purple Enterprises, Box 16291-BM, Jacksonville, Florida 32216.

QUALITY Printing, lowest prices. Samples. Dowling Press, PSA7 Pittstown, New Jersey.

BUSINESS Cards, Thermographed-Engraved, 1,000-$4.10, postpaid. Goodall, 68-A Joost, San Francisco 94131.

LETTERHEADS 8½x11, 200-$3.95. A-1 Printing, Box 4732, St. Louis, Mo.

OFFSET Printing. Prompt service. Mimeo Press, 835 Falls, Rocky Mount, N. C. 27801.

AMAZING Business Printing values. Samples. Print Shop, Box 576P, Greenville, R.I.

ENLIGHTENING Dollar-Saving Quotations! Circulars, Booklets, Letters. Lonelm, Paulding, Ohio.

100 6¾ ENVELOPES, 100 5½ x 8½ Letterheads printed—$2.35. M. Fortney, R3-X, Dillsburg, Pa. 17019.

1,000 BUSINESS cards, raised, $3.85; Two-Color $4.95. Also Wedding Invitations. Prompt. Guaranteed. Samples. Bixler, Bensen Avenue, Frankfort, Kentucky 40601.

1000 ADDRESS labels $1.00, 1000 Business cards $3.95. Printing, Rubber Stamps. Jordan's 552 West O'Connor, Lima, Ohio.

ONE Day Offset Printing, Mimeographing. Sample. Pennsway, Drawer 1340, Scranton, Pa.

58 PRINTING OUTFITS, SUPPLIES

PRINTING Presses, Type, Supplies. Lists 5c. Turnbaugh Service, Mechanicsburg, Pa.

RUBBER Stamp Presses, Hydraulic Operated. Electrically heated. Sizes 5"x8", 8"x12", 10"x15", starting outfits, supplies. Printing Presses, Type Cases and Cabinets. Custom Manufacturing, 1464 East Commercial, Springfield 2, Missouri.

PRINTING Outfits, type, supplies. Send dime for illustrated supply book and samples. Kelsey, Inc., H-8, Meriden, Conn.

SAVE 80% Offset Printing Presses, Cameras, Typewriters. Maurice Bower, Route 3, Floyd, Va.

RUBBER Stamp Presses, Supplies. Kiewiet, 2025 Barney Road, Kalamazoo, Michigan.

MAKE your own self-molding rubber stamps and printing cuts. Plexirubber, Argyle 2, Wisconsin.

NEW Type Catalog. No. 11. 96 Pages. Send One Dollar. Deductible First Order. Acme Type, 732 Federal, Chicago, Illinois.

60 FOR INVENTORS

Advertisers using this classification in & after July, 1965 issue—please contact M. Z. Scott, Popular Science, before ordering ad.

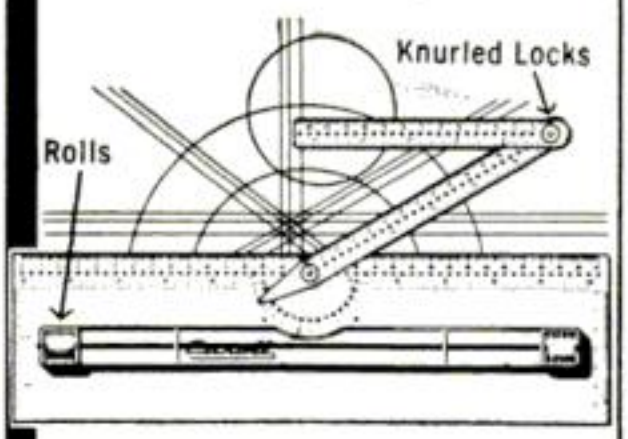
PATENT Searches, professional patent development of inventions by Licensed Professional Patent Engineer and U.S. Patent Office Former Examiner with staff of engineering specialists in all fields of inventions. Expert searches performed in the U.S. Patent Office. Your inventions and ideas engineered for maximum patent protection and greatest commercial value. Inventions developed by us negotiated for cash or royalties with our nationwide contacts. Send for free Protection "Invention Certificates" and further interesting, valuable Patent Information. George Spector Licensed Professional Patent Engineer U.S. Patent Office Former Examiner, Woolworth Building, New York.

TREMENDOUS—Savings! Prepare your patent application yourself—easily, with our New "Patent Kit!" Complete instructions, materials, sample application—send $8.95 for immediate Delivery. Money-Back Guarantee! Congress Invention Company, 210A McKim Building, Washington, 5, D. C.

PATENT Searches, including copies of related U.S. Patents, $6.00. Inventors, attorneys, manufacturers use my "Worldwide" Airmail service! "Invention Record" form and "Information Every Inventor Needs," sent free! Miss Hayward, 1029F Vermont Av., Washington 5, D. C.

CAROLL RULERS DO EVERYTHING!

Imported from Belgium



With the "Caroll" precision ruler you can
1. Measure any length and angles
2. Transpose inches into millimeters & vice-versa
3. Draw straight or perpendicular lines (any length)
4. Draw horizontal, vertical or oblique parallels
5. Draw circles, arcs, titles

Instructions with each ruler
Guaranteed $6.00 each P.P.
Agents wanted • Write or phone

HOFFMAN • P.O. Box 662-P
Garden Building, Passaic, N.J.
Phone (201) PRescott 3-3199

U. S. PATENT Office Searches, 234 Broadway, Room 3615, New York. Free Invention Certificates.

INVENTORS: Your ideas and inventions (patented; unpatented) expertly searched and developed for commercial appeal and cash/royalty sales to manufacturers by professional Invention Developer with excellent record of experience. B.S., Industrial Engineering; U.S. Patent Office former Patent Examiner; U.S. Government former Patent Adviser! Second decade of reliable service! Free "Invention Record" and Important Information. Airmailed! Write: Raymond Lee, Invention Developer, 1606V Bush Bldg., New York City 36.

PROFESSIONAL Patent Searches, $6.00, including official U.S. Patent Office copies of related U.S. Patents! Prompt, dependable service. Certified, Airmailed! For free "Invention Record Folio" and "Important Patent Information Every Inventor Should Have," write: United States Inventors Service Company, 1311 "G" Street NW, Washington 5, D. C.

PATENT Searches including Maximum speed, full airmail report and closest patent copies, $6.00. Quality searches expertly administered. Complete secrecy guaranteed. Free Invention Protection forms and "Patent Information." Write Dept. 4, Washington Patent Office Search Bureau, 426 G Street, N.W., Washington 4, D. C.

INVENTORS: Prepare your own patent application. Our "Patent Kit" includes detailed instructions and all necessary material. $14.75. Money back guarantee National Inventors Company, Box 88, Ben Franklin, Washington, D.C.

SAVE High fees! Prepare your patent application yourself! New "Do-It-Yourself" Patent Kit now makes it easy. Free "Registration Form." Miss Blaine, 306 Carry Building, Washington 5, D. C.

IMMEDIATE cash, for Patent Applications, free Patent Searches. Write for details. Universal Patents, 184-B, Marion, Ohio.

INVENTIONS wanted immediately for promoting on cash or royalty. Patented, unpatented. Free booklet outlines royalty sales, requirements. Write Kessler Corporation, C-73-FI, Fremont, Ohio.

"ENGINEERING analysis service for inventors." Concepts, designs, mechanisms. Acknowledged and confidential handling. Dynamic Systems, 5051 Canterbury, Cypress, Calif.

"INVENT & Get Rich" A new book for Inventors, $2.00 per copy. Check or M.O. Wilbro Publications, P.O. Box 507, Muncie, Indiana.

PATENT Searches, 48 hour airmail service, $6.00, including nearest patent copies. More than 200 registered patent attorneys have used my service. For free invention protection forms, write: Miss Ann Hastings, Patent Searcher, P. O. Box 176, Washington 4, D. C.

YOUR Ideas may be worth a Million Dollars, but . . . . if they stay in your head they're not worth a nickel! Now through membership in the Idea Club of America, Inc. you can sell your ideas and get maximum cash rewards. Legally protected, your ideas are consistently exposed to interested parties. Send only a $1.00 today for big illustrated book "Millions For Your Ideas", showing how you can profit by membership in one of the nation's most dynamic organizations. Idea Club of America, Inc., Dept. PS, Newton Center, Massachusetts 01259.

61 INVENTIONS WANTED

Advertisers using this classification in & after July, 1965 issue—please contact M. Z. Scott, Popular Science, before ordering ad.

INVENTIONS wanted. Patented; unpatented. Tremendous Manufacturers lists. Global Marketing Service, 2420F 77th, Oakland 5, Calif.

INVENTORS: Hundreds of manufacturers have requested our assistance in locating marketable new products. Complete information free. Institute of American Inventors, Dept. 30C, 635-F Street, N.W., Washington 4, D. C.

INVENTORS Wanted: Manufacturers need new items! Your inventions, ideas developed for cash/royalty sales. Free "Invention Record." Information, Raymond Lee 1606W Bush Building, New York City 36.

INVENTIONS Promoted—For Cash-Royalty Sales with Manufacturer Contacts. George Spector, Licensed Invention Engineer, Woolworth Building, New York.

INVENTORS! Outright cash sale or royalties for your inventions. Patented. Unpatented. Active demand from our client manufacturers. Financial assistance available. Write Dept. 30, United States Invention Brokerage, 78 Wall Street, New York 5, N. Y.

INVENTORS! We will develop, sell your idea or invention, patented or unpatented. Our national manufacturer-clients are urgently seeking new items for highest outright cash sale or royalties. Financial assistance available. 10 years proven performance. For Free information write Dept. 54, Wall Street Invention Brokerage, 79 Wall Street, New York 5, N. Y.

INVENTORS! Don't sell your invention, patented or unpatented, until you receive our offer. Eagle Development Company, Dept. S, 79 Wall Street, New York 5, N. Y.

INVENTORS! Sell your invention for cash or royalties! Our client manufacturers eagerly seek new items. Patented. Unpatented. Financial assistance if needed. 25 Years proven performance. For free information, write Dept. 17, Gilbert Adams, Invention Broker, 80 Wall St., New York 5, N. Y.

INVENTORS: Protect your ideas! Free "Recommended Procedure". Washington Inventors Service, 422-G, Washington Building, District of Columbia, 5.

WE either sell your invention or pay cash bonus. Write for details. Universal Inventions, 298-G, Marion, Ohio.

IF your invention is adaptable to promoting we will contract for selling on cash or royalty. Free booklet outlines royalty rates, requirements. Kessler Corporation, C712-IW, Fremont, Ohio.

Urheberrechtlich geschütztes Material

INVENTORS! Don't sell or license your invention for cash or royalties until you receive our offer. Financial assistance available. For Free information, write: Dept. 72. International Invention Institute, 17 Park Row, New York 38, N. Y.

64 MODELS, MODEL SUPPLIES

ROCKETS: New Illustrated Catalog 25c. Single And Multistage Kits, Cones, Engines, Launchers, Trackers, Technical Information, Etc. Fast Service. Estes Industries, Penrose 3, Colorado.

SHIP and Yacht model fittings; Pine construction Hull Kits; blueprints. Send 50c for Illustrated catalog. A. J. Fisher, Inc., 1002 Etowah Avenue, Royal Oak, Michigan. 48067.

SHIP Models, Kits, fittings, plans, books, tools, engines, motors. Big illustrated catalog 50c. James Bliss & Co., Dept. PS, Route 128, Dedham, Massachusetts 02026.

SHIP Model Kits and fittings: clippers, frigates, etc. Catalog, paint-tool list, book list, 35c. Model Shipways, Box 85, Bogota, New Jersey.

LIVE Steam, Gasoline engine castings kits. Fittings, accessories. Numerous ideas for Christmas gifts to delight the mechanical minded man or boy. Illustrated catalog $1.00. Coles' Power Models, Ventura, Calif.

HARD-To-Find Tools for modelers, craftsmen. Catalog 10c. Brookstone, Worthington 26, Massachusetts.

STEAM-Marine, Loco Engine castings. Catalog 25c. Ship Models, Ltd., Andover, Massachusetts.

TRAIN Bargains! Slot Racers! 25c brings 32 page catalogue. Thousands of Lionel, Gilbert, Varney, Strombelker, Eldon, Aurora, Scalextrix Revell, etc. Trains, all gauges, Racers, all sizes. Hobby Surplus, P.O. Box 11065, New Britain, Conn.

MECCANO Construction Outfits All Sizes. Spare Parts Service. More than 300 to choose from. Maillefer-Selections, Box 505, Berkeley, California.

64B ELECTRIC TRAINS

LIONEL Trains Bulletin 10c. Catalog 25c. Mack Bros., 2041 Chicago Ave., Chicago 60622.

65 HOME CRAFTSMAN

WOODWORKING Catalog and Manual 25c. Plus free "101 Project Ideas." World's most beautiful veneers, lumber, plywood! Wood finishing, upholstery supplies. Furniture hardware. 2,000 needed workshop products. Constantine, 2053-T Eastchester Road, Bronx 10461.

SKIL-CRAFTS New '65-'66 Catalog. Largest and Finest selection of Leathercraft, Artist, Hobbycraft supplies in the world. Free Gift with first order. Send 50c. Refundable with first order. Skil-Crafts, Box 167-PS, Joplin, Mo.

2512 PLANS. Patterns, Things to make do. Fun. Profit. World's greatest selection. New catalog 10c. Craftplans, 18250-B Harwood, Homewood, Illinois.

KILLER Shark tooth bracelet kit—complete, educational, attractive gold-white, easy—$1.25. Sea Maid! Box 965, Venice, Florida 33595.

MAKE $100.00 Formica Counter Tops with few dollars' material. Complete instructions $1.00.—Build cabinets like professionals, with new manual, "Cabinet-making Made Easy," $2.00. Japs, 126-L Seventh North, Hopkins, Minn. 55343.

SQUAREKNOTTERS: Make belts, handbags, lanyards, dog leashes, etc. Special offer! Beginner's book, catalog and quality cord samples 25c. P. C. Herwig Co., Dept. 71-P1, 264 Clinton St., Brooklyn, New York 11201.

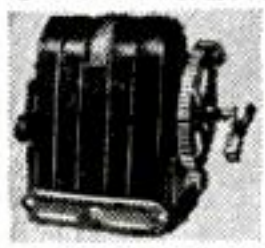
PICTURE Frame Moulding—Any size, style and wood. All original patterns! Details 10c. Japs, 126-L Seventh North, Hopkins, Minn. 55343.

66 DO IT YOURSELF

BUILD Husky three or four wheel Garden Tractor, Powered Wheel Barrow, Composter using Plywood, our Components, Plans. Thomas N. Matthew Products, P.O. Box 573, No. Bergen, N.J.

NEW!
ALL-WOODEN CLOCK PLANS
Build this ideal hobby project from simple plans. No special tools required. Weight driven. Keeps perfect time. Will mount in grandfather case.
(Plans only) $3
R. D. Thomas
1412 Drumcliffe
Winston-Salem, N.C.

5 BAR GENERATOR $4.95!



Telephone type generator with 90 volt output. Will ring standard telephone bell. Good experimental item. Write for free list.
Shipments FOB Simpson, Pa.
TELEPHONE ENGINEERING CO.
DEPT. 12A5 SIMPSON, PENNA.

PROTECT YOUR HOME FROM THIEVES
"PRIVATE EYE" BURGLAR ALARM

Only $2.98
2 for $5 ppd.
- Battery operated
- On-Off Switch
- Rings when actuated

MANSON SPECIALTIES, Dept. PS
2676 Grand Concourse, New York 10458

HEAVY DUTY BALL-BEARING PUMP

IRRIGATE • DRAIN
CIRCULATE • SPRAY
Ball bearing, all-metal rust-proof pump. Stainless shaft. Use ¼ HP or larger. 1 HP for up to 5,200 GPH; 1,000 GPH 60' high or 3,000 GPH from 25' well. 1¼" inlet. 1" outlet. For direct or belt drives. **Only** **$12.95**
Famous Labawco Type P utility pump. Hundreds of thousands in use. Stainless shaft. Won't rust or clog. Bronze bearing. Use ⅛ HP motor or larger. ¾ HP for up to 2,400 GPH. 1,800 GPH from 25' well. 1" inlet. ¾" outlet. Free coupling. A real value at **Only** **$8.95**
Postpaid if cash with order.
Money Back Guarantee.
LABAWCO PUMPS Belle Mead 101, N.J.

MINIATURE, ALL PURPOSE CALCULATOR

A precision instrument that will do all the calculations of larger expensive desk models. Weighs only 8 ounces, fits hand.
Fast, accurate, sturdy . . . completely portable. Ideal for all on-the-spot calculating. Fully guaranteed. Price $120.00, available on trial basis. Write for *free* literature.
CURTA COMPANY DEPT. PS-12
P.O. BOX 3414, VAN NUYS, CALIF.

ARCH Supports—Cork and rubber composition. Light, solid, springy. You cut to fit. Adjustable. Price $2.80 includes insole and instructions. Drew Moran, 6045 Fairfield, Los Angeles, California 90022.

BUILD Your own Tractor Plans. Free information. Eltraco, Dept. B, Camptonville, California 95922.

FREE Details. Marshall's Directory of "How-To-Do-It" Books. Marshall's, 1135C So. Birmingham, Tulsa, Oklahoma 74104.

SECONDS required to cut glass bottles in half. Make drinking glasses, interesting vases, etc. Complete instructions $1.00. Bailey, P.O. Box 809, Fort Walton Beach, Florida 32548.

67 OLD GOLD, JEWELRY, WATCHES, ETC.

USED and new watches $2 up. Free Catalogue. Southern Watches, 5-PS So. Wabash, Chicago 3.

HIGHEST Cash for Gold, Jewelry, Gold Teeth, Rings, Diamonds, Watches, Silver, Platinum. Mail Articles Today. Free gift with Information. Chicago Gold & Precious Metals, 6 E. Monroe, Dept. 2657, Chicago 3.

CASH Immediately for old gold, watches, diamonds and jewelry. Write Barney, Joseph Bros., 5 South Wabash, Chicago 60603.

69 FOR THE HOME

NEW! Different! Distinctive! Eighty Seven, Three Sixty Nine. All house numbers in beautiful 6" modern script lettering. $3.95 per word. Add 50 cents handling. Black or White Check. M.O. House Numbers in Script. P.O. Box Thirty Three, Staten Island, N.Y. 10310.

ROACHES? Waterbugs? Ants? Mice? Exterminate all. Years supply $1.00. Box 793P, Charlotte, N.C.

70 OF INTEREST TO WOMEN

'PROPHET Elijah Coming Before Christ'' Wonderful Book Free. 58 Megiddo Mission, Rochester 19, New York.

MAKE Money Writing Short Paragraphs. Information Free, Barrett, Dept. C-86-K, 6216 North Clark, Chicago, Illinois.

$400.00 MONTHLY Possible . . . Home Typing! Full or Part-time. Instruction Manual, $1.00. Pulse, Box 18177-EL, Indianapolis, Indiana 46218.

SEQUINNED/Beaded Blouses, Sweaters, Handbags. Mandarin Mail-Order, P. O. Box 4973, Hong-Kong.

HOMEWORK. $180.00 earned monthly. Free details. Warco's, Box 2266H, Dublin, Calif. 94568.

TRIPLE timer! Only $3.98! Free Catalog. Bell, Box 422-A, Asbury Park, N.J. 07713.

CHRISTMAS — Surprise friends with Christmas cards postmarked "Christmas" Florida. Ultimate novelty in Christmas card mailing. Send your stamped, addressed cards for remail from "Christmas" Florida to—Roberts, 1008 Lee, Rockledge, Fla. 32955. $2.00 handling.

$200.00 MONTHLY possible, sewing Babywear! Write: Cuties, Warsaw 15, Indiana.

71 FOR SALE MISCELLANEOUS

BUILDERS! Make rafter cutting easy! Free information. Emmert Products, Sycamore, Illinois 60178.

GADGETEERS—Free catalog on Surplus Electronics, Hydraulics, etc. Earl's Supply Company, P. O. Box 265, Lawndale, California 90260.

T-PUZZLE. Send fifty cents to Alton Enterprises, Box 206, Powell River B.C., Canada.

LUXURIOUS Mink can openers $1.00 Postpaid. Mink Enterprises, Box 63, Troy Center, Wis.

72 WANTED TO BUY

QUICKSILVER, platinum, silver, gold. Ores analyzed. Mercury Terminal, Norwood, Massachusetts.

74 RAZOR BLADES, SHAVERS

HIGH quality Electric Shaver of precision Swiss craftsmanship imported directly to you from Switzerland. Send $8.95 with order. Pay postman 40c on arrival. Ivan Cadwalader, 2601 N. Madison St., Peoria, Ill. 61603.

76 ARTISTS SUPPLIES

COLOR Computer. Color mysteries simplified! Artists, Decorators, Designers find this handy device useful. $2.00. Color Computer Kit, 2150-90 S. First, San Jose, California.

Urheberrechtlich geschütztes Material

77 TREASURE FINDERS & GEIGER COUNTERS

TRANSISTOR Treasure Detectors, underwater detectors. Many models. Free catalog. Gardiner Electronics Co., Dept. 1, 4729 N. 7th Avenue, Phoenix, Arizona.

TREASURE. Find gold, silver, relics with super powerful Detectron locators. Free information. Detectron. Dept. 12-PS. San Gabriel, California.

TREASURE, Gold, Silver, Relics. Find them with new 1965 models. Free information. Rayscope, Box 715, North Hollywood, California.

POWERFUL Metrotech Locators Detect Gold, Silver, Coins, Relics. Moneyback Guarantee, Terms, Free Information. Underground Explorations, Dept. D, Box 793, Menlo Park, California.

TREASURE Hunters, prospectors, beachcombers; pinpoint exact location buried coins, relics, gold, silver with powerful metal locators. Free literature. Write: Goldak, Dept. A-12, 1544 W. Glenoaks, Glendale, California 91201.

NEW Coin Locator! Free literature! Howe, 811-A Kansas, Atchison, Kansas.

NEW supersensitive transistor models detect buried gold, silver, coins. Kits, assembled models. $19.95 up. Underwater models available. Free catalog. Relco-A41, Box 10563, Houston 18, Texas.

FUN & Profit finding buried treasure, relics with transistor M-Scope. Known worldwide for super-sensitivity, dependability. Guaranteed. Very easy terms. Send for Free literature, fascinating user experiences. Fisher Research, Dept. DZ, Palo Alto, Calif.

SAVE! Build Transistorized Treasure Finder. Details Free. Del Research, Box 347A Alden Manor, Elmont, N. Y.

METAL Detectors and kits, powerful, sensitive, light-weight, rugged. High-quality circuits, low cost. Electronic Development, Incorporated, 2538-S Colorado, Sarasota, Florida.

COINFINDER Completely Assembled. Cast in Solid Plastic. Excellent Xmas Gift. Use with Transistor Radio. Only $6.00 Postpaid. Azle Dist. Company, 141 Lynn Drive, Azle, Texas.

METAL Locator kits and assembled models from $39.90. Terms. Transistorized models available. Free catalog Electronic Applications, Dept. S, Box 6095, Alexandria, Virginia.

TREASURE-Fone Automatic. A new principle in electronic metal detection. Patent Pending. $129.50. Write: Highlander Co., Dept. 22, 10308 Brenda Way, Rancho Cordova, Calif.

COIN-COMBER metal detector. Sensitive silicon transistor circuit. $39.95 assembled. Racom, Box 13469-A, Orlando, Fla.

78 WATCH REPAIRING

WATCH and clock repairing books. Free Catalog. North American, Box 77-BN, Fox River Grove, Illinois. 60021.

WATCHMAKERS'-Jewelers' supplies, instructions. Catalog 50c. Bengal's. 10717 Venice, Los Angeles 34, California.

WATCHMAKERS' Tools, Materials, Supplies. Watches. Catalog. Gales, Box 1000. Chicago 90. Illinois.

HARD-To-Find Tools for watch, clock, jewelry makers. Catalog 10c. Brookstone, Worthington 27, Massachusetts.

79 MISCELLANEOUS

ARTIFICIAL eyes (Human). Expert selection sent. Free booklet, color chart. Established 1906. Denver Optic, 1014 University Bldg., Denver Colorado 80202.

WINEMAKERS: Free illustrated catalog of yeasts, equipment. Semplex, Box 7208, Minneapolis, Minn. 55412.

FREE Wholesale Catalog! 10,000 Products . . . Tremendous Discounts! Taylor Distributors, Newton 3, New Jersey.

EXCLUSIVE 3-WAY HEAVY KNIT HOOD, HAT OR UNDER CHIN

BRAND NEW Storm Hood

$1.19 plus 15¢ postage
6 for $7 ppd.

Warm wool in black or red. Protects head, mouth, neck and ears, keeps out cutting wind and biting cold. Fits men, women, children. Available only by mail. Moneyback guarantee.

BARCLAY DEPT. 58-N
170-30 Jamaica Ave., Jamaica, N.Y., 11432

Ugly Blackheads—Out in Seconds

Keep your complexion free of blackheads—look attractive instantly. Scientifically designed vacuum pump gently "lifts" out ugly blackheads safely. No pinching or squeezing. Made in U.S.A.—Beware of imitations. Try 10 days—if not delighted return for refund. Send $1.25 Postpaid. **BALLCO PRODUCTS CO., Dept. 194, 735 E. State St., Westport, Conn.**

BILLIARD SUPPLIES

Build your own TABLES
ALL PRICE RANGES
Plans 6 to 9 ft. sizes

Send .35 for catalog and cloth samples
CAMPBELL BILLIARDS
Box 260A, Hartland, Wisconsin

NEW MUSICAL CHRISTMAS CARDS, expresses true sentiment of the season to your friends and children. Features: A picture in full color. A Hi-Fidelity 33⅓ record. An original story. International Christmas wishes. A personal greeting and mailing envelope. Order for Adults Type-A, for children Type-B. Ppd. $1.10 each. No C.O.D. ROMAN STUDIOS, 17 William Street, Dept. O, Newark N. J. 07102.

ANYTHING you need, we locate for a reasonable fee. NBARS, 9325A Menard, Oaklawn, Ill. 60453.

FASCINATING! Unusual Publications! Details, 25c; Wilson, Box 262AF, Bellflower, Calif.

SCIENTIFIC Utopia being planned. Read Dr. B. F. Skinner's Book "Walden Two" and write: Gerald Baker, Mondamin, Iowa.

BLITZ-Reducing! 5 pounds overnight! Guaranteed! Bijou, Box 1727-BV, Hollywood, California. 90028.

LISTEN-IN Device! Unnoticed! Monitor telephone conversations, etc. $3.98 complete. (Guaranteed). Research Enterprises, 29-TL5 Samoset, Woburn, Mass.

HANDMADE Rosaries, Crystal Aurora Borealis, Sterling. Details free. Martin Savula, 1411 Greenwood Ave., Akron, Ohio 44320.

SAFEGUARD Privacy! New instrument detects electronic "bugs," wire-tapping and snooping devices. Free information. Dee Equipment, Box 7263-E3, Houston 8, Texas.

MEN! Confidential Directory contains 70 dealers, unusual unique items—$1.00. Sherrin, 300-NW 36th Street, Miami, Florida 33127.

80 PERSONAL

LOANS by Airmail $100-$1000. Anywhere. Confidential. Write Union Finance. Dept. PS, 222 W. Osborn, Box 7457, Phoenix, Arizona.

INVESTIGATORS, free brochure, latest subminiature electronic surveillance equipment. Ace Electronics, 11500-F, NW 7th Ave., Miami, Florida 33168.

BORROW $1,233 Airmail! Repay $54 for twenty-nine months. State licensed. Postal Finance, Dept. 11-L, Kansas City, Kansas 66117.

LOSING Hair? Balding? Dandruff? Free copyrighted booklet. Dr. Shiffer Laboratories, 533 Euclid Arcade, Cleveland, Ohio. 44115.

CONSOLIDATE All Your Bills into one—small monthly payment! Borrow $100 to $1,000 by mail! Pay off all your debts—repay in convenient, monthly payments . . . take up to 36 months. $5.00 repays $104.65; $14.00 repays $293.02; $25.00 repays $532.26; $33.00 repays $819.57; $40.00 repays $1,009.36. Everything comes to you in a plain envelope! "U.S. Mail" secrecy . . . no cosigners needed! Get the money you need fast . . . Write for information today! No obligation! Dial Finance Co., Dept. 12-215, 410 Kilpatrick Bldg., Omaha, Nebraska 68102.

BIRTH Certificates, Marriage Certificates, Diplomas! 2 blank forms $1.00. Sample 10c. Standard Forms, Box 482-S, Washington, D. C. 20044.

TIME of End Date Discovered! Free. Write: Harvest Publishers, Jefferson City, Missouri 65102.

MEXICAN Law General Practice. 1203 Arizona Ave., El Paso, Texas 79902.

SUPER memory overnight! Success guaranteed! Bijou, Box 1727-V, Hollywood 28, Calif.

FREE Catalog of quality gifts for that special occasion. Modern Items Co., 332 N. 81st, Seattle, Wash. 98103.

PHOTOGRAPH of your Choice. Name, Address on New Photolabels. Details. Mail-O-Mart, Box 1256, Spokane, Wash. 99210.

"WHO, Me?" Yes, you! "How to Change Your Life With Programmed Prayers". Sent free. Rush request: President, Box 1924-0, Louisville 1, Ky.

BALDING? Try my method. $3.00, Albert Echols. 3438 6th Ave., Los Angeles, California 90018.

PROPERTY Owners. Your mapping specialist, write today, Deed-Ettes, Mt. Pocono, Pa.

FREE Details. How to Retire without Money. Deaver, Box 5148, San Mateo, Calif. 94403.

NEW Method stops Hair Loss, grows more hair. Try our European lotions. International Laboratories, Box 4176, Miami Beach, Florida 33141.

80A REMAILING SERVICE

MAILING Address $5.00, Telephone Answering $13.50. Federal Building Suite, 534-1522 K St., N.W., Washington, D.C.

SECRET Mail Receiving System, Hedgpeth, 406-PS South Second, Alhambra, California 91802.

PRIVATE Address, Remails 25c. Information Quarter, Horton, Kensington Road, Greenville, South Carolina 29609.

ITALY re-airmails $1.00. Sample postcard, information 35c. Capodilupo, Box 7096, Nomentano, Rome, Italy.

MICHIGAN remailing 25c. Monthly $3.00. Warner, 1603 Lyon St., N.E., Grand Rapids, Michigan 49503.

SOUTH America Registered re-airmails $1.00. Confidential, reliable. Leon, Box 360, Guayaquil, Ecuador.

80B LOANS BY MAIL

LOANS by Airmail $100-$1000. Anywhere. Confidential. Write Union Finance. Dept. PS. 222 W. Osborn, Box 7457, Phoenix, Arizona.

LOW-COST Loans by Mail. $6.00 monthly repays $104.50; $56. monthly repays $1,321.39. Borrow any amount. Guaranteed fast, confidential. Write today! Bankers Investment 53-B, Box 1648, Hutchinson, Kansas 67501.

This One
FF7H-91W-U9DY

Urheberrechtlich geschütztes Material

PUT THIS ON YOUR DESK AND SAVE! — AUTHENTIC REPLICA OF THE MASSIVE TURN-OF-THE CENTURY MOSLER SAFES

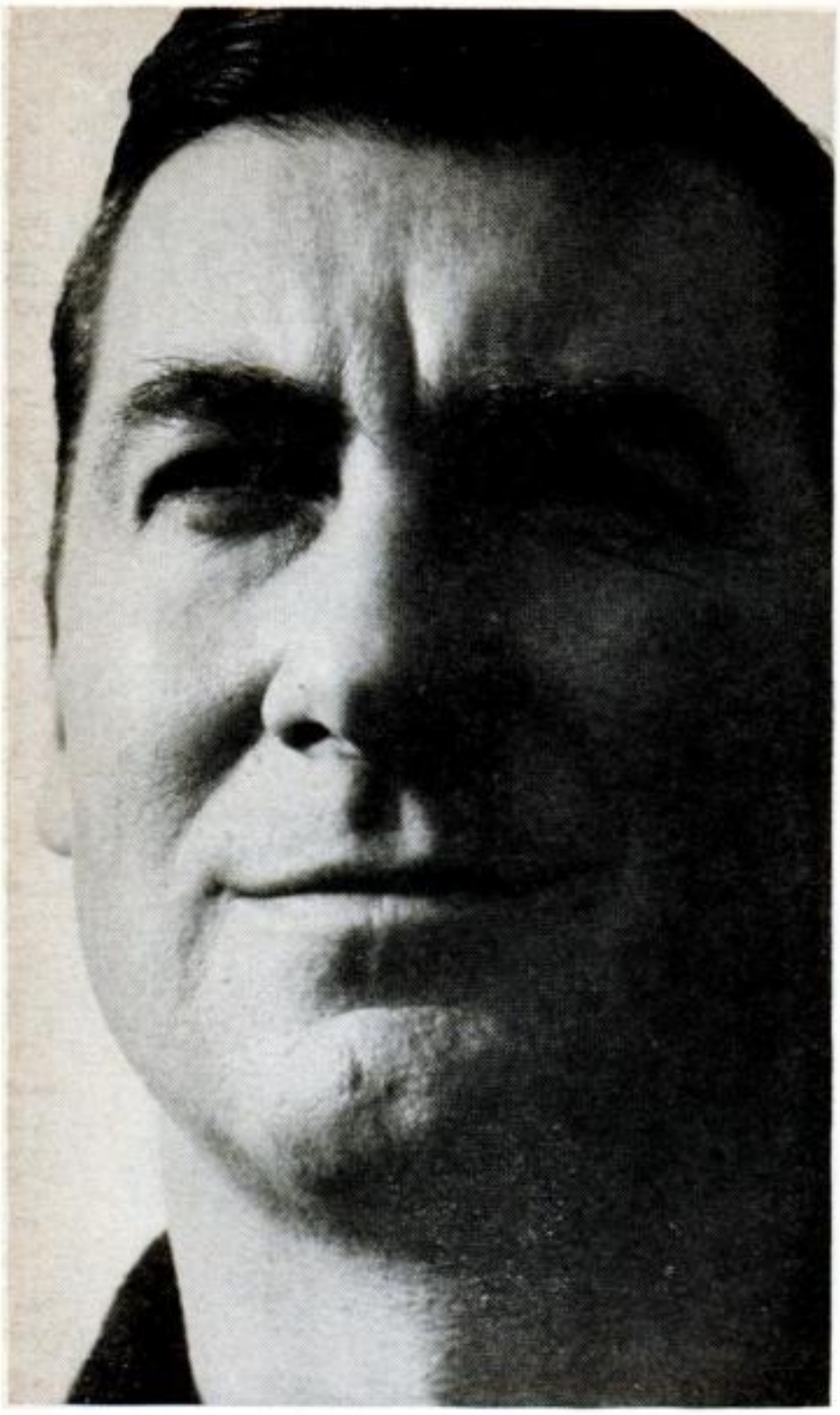
$1,000 Bank on Wheels-$5.95

- Stands 3/4 Ft. Tall
- Combination lock
- Holds $1,000.00 in change
- Complete to rubber tires, eagle & gold leaf designs

This is a fine replica of the massive Mosler safes considered impregnable 100 years ago. This all-steel black one has authentic colorful eagle and gold-leaf designs, handsome gold floral edging. Each has its own different combination lock and is big enough (6″ x 7″ x 9″) to hold a full $1,000 in change. Separate inside compartments hold money apart from valuable papers, letters, jewels, stamps, stocks, etc. If you have anything personal, or of value, this is small cost for big protection. Solid Americana right to the rubber tires. Nice way for young and old to save. New and a solid value for $5.95 ppd.

MADISON HOUSE, Dept. FS-12, 122 East 42nd Street, New York 17

Urheberrechtlich geschütztes Material



IT TAKES A REAL MAN TO WIN AN I.C.S. DIPLOMA!

Here's training for the man who can take it "straight"—without the fancy trimmings.

With I.C.S., your "classroom" is your home. Your "laboratory" or "shop" is the place you work. Every minute you spend is productive—no commuting. no long-winded discussion groups, no waiting for slower students to catch up.

You gauge your progress not by marks and grades alone but by pay boosts and promotions. And these are likely to come fast.

This is the most demanding kind of training. You select your own subjects, set your own pace. apply what you learn to your own specific needs —all while holding down a full-time job and possibly supporting a family.

Is it any wonder that men who can win I.C.S. diplomas often turn out to be leaders in their fields? I.C.S. has more of its former students now in supervisory and management positions than any other school.

It takes a real man to win an I.C.S. diploma. And the first step is mailing the coupon. Such a simple act sounds easy. Actually, it's the one thing that separates the "planners" from the "plodders." If you're the man we think you are, you'll mail the coupon NOW.

Clip coupon here—and take your first big step to real success! **I.C.S., Scranton, Penna. 18515** **Accredited Member National Home Study Council**

INTERNATIONAL CORRESPONDENCE SCHOOLS ICS 75th YEAR

Dept.1297, Scranton, Penna. 18515 (In Hawaii: P. O. Box 418, Honolulu.)

Without cost or obligation, rush me FREE Success Kit, with 3 valuable booklets: (1) How to Succeed; (2) opportunity booklet about the field I've checked below; (3) sample I. C. S. lesson. **Write for new W. I. C. S. package for women.**

ARCHITECTURE and BUILDING TRADES
- ☐ Air Conditioning
- ☐ Architecture
- ☐ Arch. Drawing
- ☐ Building Contractor
- ☐ Carpentry & Millwork
- ☐ House Planning
- ☐ Painting
- ☐ Plumbing & Heating

ART and DESIGN
- ☐ Commercial Art
- ☐ Interior Decorating
- ☐ Illustrating
- ☐ Show Card & Sign Painting
- ☐ Sketching and Painting

AUTOMOTIVE
- ☐ Auto Electrical Technician
- ☐ Automotive Mechanic
- ☐ Engine (Gas & Diesel)
- ☐ Engine Tune-Up
- ☐ Transmission Specialist

BUSINESS
- ☐ Accounting
- ☐ Cost Accounting
- ☐ Public Accounting
- ☐ Bus. Administration
- ☐ Executive Training
- ☐ Marketing
- ☐ Personnel-Labor Relations
- ☐ Practical Accounting
- ☐ Programming for Digital Computers
- ☐ Purchasing Agent
- ☐ Real Estate
- ☐ Salesmanship
- ☐ Sales Mgmt.
- ☐ Small Business Mgmt.
- ☐ Traffic Mgmt.

CHEMICAL
- ☐ Analytical Chemistry
- ☐ Chem. Engineering
- ☐ General Chemistry
- ☐ Chem. Lab. Technician
- ☐ Nuclear Energy
- ☐ Plastics
- ☐ Pulp, Paper

CIVIL ENGINEERING
- ☐ Civil Engineering
- ☐ Highway Blueprints
- ☐ Highway Engineering
- ☐ Structural Blueprints
- ☐ Sanitary Engineering
- ☐ Structural Engineering
- ☐ Surveying & Mapping

DRAFTING
- ☐ Architectural
- ☐ Drafting Technology
- ☐ Electrical and Electronic
- ☐ Mechanical

ELECTRICAL
- ☐ Elec. Appliance Servicing
- ☐ Electrical Engineering
- ☐ Elec. Motor Repairman
- ☐ Industrial Telemetering
- ☐ Instrument Technician
- ☐ Practical Electrician
- ☐ Practical Lineman

ELECTRONICS
- ☐ Automation
- ☐ Electronic Computers
- ☐ Electronics Technician
- ☐ General Electronics
- ☐ Hi-Fi Stereo and Sound Systems
- ☐ Industrial Electronics

ENGINEERING (Professional)
- ☐ Chemical ☐ Civil
- ☐ Electrical
- ☐ Mechanical

ENGLISH and WRITING
- ☐ Better Business Writing
- ☐ Introductory Technical Writing
- ☐ Short Story Writing
- ☐ Practical English

HIGH SCHOOL
- ☐ High School Business
- ☐ High School General
- ☐ High School Math
- ☐ High School Secretarial
- ☐ High School Vocational
- ☐ College Preparatory

LANGUAGES (Edited by Berlitz)
- ☐ French ☐ German
- ☐ Italian ☐ Spanish

MECHANICAL and SHOP
- ☐ Gas and Electric Welding
- ☐ Industrial Engineering
- ☐ Industrial Instrumentation
- ☐ Machine Design
- ☐ Machine Shop Practice
- ☐ Mechanical Engineering
- ☐ Reading Shop Blueprints
- ☐ Tool Design
- ☐ Toolmaking
- ☐ Safety Engineering

SECRETARIAL
- ☐ Clerk-Typist
- ☐ Legal Secretary
- ☐ Medical Secretary
- ☐ Professional Secretary
- ☐ Shorthand
- ☐ Stenographic ☐ Typist

STEAM and DIESEL POWER
- ☐ Boiler Inspector
- ☐ Power Plant Engineering
- ☐ Stationary Diesel Engineering
- ☐ Steam Engineering

SUPERVISION
- ☐ Foremanship—Supry'n
- ☐ Personnel—Lab. Rel'ns

TV-RADIO
- ☐ Radio and TV Servicing
- ☐ Radio-Telephone License
- ☐ TV Technician
- ☐ Practical Radio-TV Engineering

MISCELLANEOUS
- ☐ Textile
- ☐ Other (please specify)

Name _____ Age _____
(Please indicate whether Mr., Miss or Mrs.)

Address _____

City _____ State _____ Zip Code _____

Employed by _____ Working Hours _____ A.M. to P.M.

Occupation _____

Special low rates to members of the U. S. Armed Forces! Special training programs for industry.

Urheberrechtlich geschütztes Material

Makes a fine second car. Or a wonderful first truck.

Does the car-like ride of Ford pickups mean we've gone soft? Quite the contrary. Instead of one, we now have two I-beam axles up front, one for each front wheel, working independently. Shocks at one wheel don't get passed over to the other. Or to the driver. Husky radius rods hold wheel alignment too. Even the engines have big muscle: two husky Sixes have such punch, we had to develop a big new V-8 to keep ahead of them. So relax. Enjoy Ford's smooth ride. Just remember that under that velvet is a solid truck, with toughness where it counts. Very comforting.

Two front axles of forged steel I-beam make Ford's Twin-I-Beam suspension the most durable independent suspension in any pickup.

FORD/66

Urheberrechtlich geschütztes Material

IF YOU'RE THE KIND OF SPORTSMAN LOOKING FOR . . .

ACTION

LOOK NO FURTHER . . .

Owens Cruisers take you where the action is . . . where the excitement of sport fishing begins . . . where cruising, exploring or just plain lolling about is fun for all the family. Take the giant step to inboard fun—move up and into an Owens inboard cruiser today. Your friendly Owens dealer will be glad to show you why Owens is your best cruiser buy!

Owens "Matador"
28′ Sea Skiff Express

Here's a handsome inboard that does everything in style. Owens rugged lapstrake hull gives smooth cruising comfort. Large homey galley is compact and complete. Plenty of storage space with roomy drawers and hanging locker. Convertible dinette and forward vee berths. Big, fun-sized aft cockpit deck is vinyl covered. Bow pulpit and side rails standard.
And action . . .
Owens 225 h.p. Flagship Marine V8 will lead all the way home!

Owens "Contessa"
26′ Flagship Express

This big beamy four-sleeper has plenty of built-in living and fun room. Rugged, beautiful and built for action people, this spacious cabin sleeps two on convertible dinette and two on forward vee berths. Bright, efficient galley is compact and complete. Hanging locker and generous size drawers provide plenty of storage for fisherman and family. Roomy, vinyl covered aft flush cockpit. Packed with the action power of Owens 225 h.p. Flagship Marine V8.

YOU CAN OWN AN OWENS FOR LESS THAN $100 A MONTH. SEE YOUR NEAREST OWENS DEALER TODAY.

Owens Yacht Division, Brunswick Corporation
Baltimore, Maryland 21222

Please send me complete information on

Owens _____

Name _____

Address _____

City _____ State _____

I presently own a _____
Year Length Make

OWENS

YACHT DIVISION / *Brunswick* CORPORATION

BALTIMORE, MARYLAND 21222

Urheberrechtlich geschütztes Material